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ABSTRACT

This report summarizes the discussion and conclusions of an educational roundtable examining the collected research on K-12 single-sex education produced over more than two decades. The one day roundtable generated many points of disagreement and several profound unanswered questions. Nonetheless, there was consensus on a series of statements. These included: (1) there is no evidence that single-sex education in general "works" or is "better" than coeducation; (2) no matter whether in a coed or a single-sex setting, educators and policymakers need to work further to identify the components of a "good education"; (3) single-sex educational programs produce positive results for some students in some settings; (4) the long-term impact of single-sex education on girls or boys is unknown; (5) no learning environment, single-sex or coed, provides a sure escape from sexism; and (6) single-sex education covers so broad a gamut as to defy most generalizations. The volume also presents a literature review by Pamela Haag and four roundtable papers: "Is Single-Sex Secondary Schooling a Solution to the Problem of Gender Inequality" (Valerie E. Lee); "The Future of Single-Sex Schools" (Cornelius Riordan); "What's Sex Got to Do with It? Simplistic Questions, Complex Answers" (Patricia A. Campbell; Ellen Wahl); and "The Contexts of Single-Sex Classes" (Diane S. Pollard). Each paper contains references. Appendixes include materials prepared for and distributed at the AAUW Educational Foundation's Single Sex Roundtable in November 1997.

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a critical look at single-sex education for girls

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American Association of University Women Educational Foundation

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separated by SEX

a critical look at single-sex education for girls

American Association of University Women Educational Foundation

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Foreword

Few subjects in public education have so captured the popular imagination in recent years as has single-sex education.

Out of a conviction that separating students by sex somehow works better for at least some, scattered public schools in Virginia, Maine, New Hampshire, New York, Illinois, and California have all experimented with the practice. In the wake of these experiments, public discussion has often focused more on legal and political concerns than educational results.

Recognizing the need for further information, the American Association of University Women Educational Foundation here presents a comprehensive inquiry into the subject. The findings of the foremost scholars in the field illuminate the complex educational issues raised by the separation of students by sex.

Do students learn better under such conditions? Which students? And where educational outcomes do differ, to what extent is the gender makeup of the classroom or the school responsible?

These are knotty questions, to be sure. But they are questions that go to the heart of the matter, questions that demand consideration by those engaged in the critical dialogue about the future of public education in the United States.

It is fitting that the Foundation take the lead on this issue. Six years ago, the Foundation's publication of *The AAUW Report: How Schools Shortchange Girls* (1992) stimulated widespread discussion about equitable schooling for girls. From the report, the public recognized that public schools are not doing a good job educating all students. The next question was: what to do about it?

In the intervening six years, the Foundation has fielded scores of inquiries about the effectiveness of single-sex schooling. The authors of the Foundation's 1995 research report *Growing Smart: What's Working for Girls in School* voiced support for short-term experiments in separate schooling, emphasizing the need for further assessment.

On November 12, 1997, the Foundation convened the most respected researchers in the field to compare findings on single-sex education at a roundtable discussion. The idea was not to create an artificial "pro" or "con" debate, but to consider all aspects of available research to assist educators, policymakers, and other researchers in their thinking.

We present the highlights of that historic roundtable here, together with an extensive literature review, in an effort to inform public knowledge about this approach to learning.

Maggie Ford
President
AAUW Educational Foundation
March 1998

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Points of View: Discussion Summary

Do girls and boys learn better in schools and classes that separate them by sex? Does single-sex education deserve a greater place in the nation's public school system? For many in the educational community and beyond, these have become pressing questions as public clamor has mounted for some good news about the nation's schools.

In an educational landscape marked by problems of low achievement, violence, drugs, poverty, sexism, and racial and ethnic tension, the emergence of single-sex education has been regarded by some as a rare glimmer of hope, a promise of a way out. Buoyed by good press and wide public interest, single-sex classes and even some single-sex schools are cropping up with increasing frequency across the country, testing the limits of social policy and anti-discrimination laws.

Information, however, has not kept pace. While there has been considerable exploration of the legal and political issues surrounding single-sex education (classes or schools attended by students of only one sex), there has been comparatively little examination of the educational implications and the research in the field.

On November 12, 1997, the AAUW Educational Foundation convened a historic roundtable of educational scholars to examine the collected research on single-sex education in grades K-12 generated over more than two decades. The purpose of the one-day forum was to identify key findings for use by the broader education and research community, while correcting misperceptions and pinpointing areas needing further study. The 16 prominent researchers who took part in the roundtable shared a desire to help clarify the subject's complexities for educators, who are grappling increasingly with the question of what role, if any, single-sex education should play in national educational reform.

The roundtable was stimulated by a comprehensive literature review by AAUW Educational Foundation research associate Pamela Haag (see "Single-Sex Education in Grades K-12: What Does the Research Tell Us?" in this volume). Roundtable participants presented four papers (by Patricia

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Campbell and Ellen Wahl, Valerie Lee, Diane Pollard, and Cornelius Riordan) and reviewed the implications of the presenters' findings. The presenters' papers also appear in this volume. For a list of all roundtable participants, some of whose ideas are cited below, see the appendix.

This section of the report summarizes the roundtable discussion and the participants' suggestions for future research.

Some Key Points

The idiosyncratic nature of current single-sex education in K-12 schools and classes makes it a less than ideal research subject. Because single-sex education takes place at present in limited arenas and under widely varying conditions, comparisons are difficult to draw from site to site, and findings about the strategy's effectiveness are often subject to interpretation. Acknowledging these problems, researchers discussed contexts in which the practice has been linked with positive results for students, along with contexts where results have been negative or mixed, and explored possible reasons for the differences.

As inevitably occurs when a distinguished group of experts has the opportunity to engage in debate, the roundtable generated many points of disagreement and several profound, unanswered questions. This notwithstanding, the following basic points of consensus emerged from the discussion:

- **There is no evidence that single-sex education in general "works" or is "better" than coeducation.** The "success" or "failure" of any K-12 single-sex education initiative is relative to a particular group of students in a particular setting and a given set of academic or social objectives. Claims that single-sex education is inherently "better" or "worse" than coeducation beg the questions: What constitutes a "good" education? And for whom?
- **No matter whether in a coed or a single-sex setting, educators and policymakers need to work further to identify the components of a "good education."** It is a mistake to view gender as "the key variable" that determines a school's effectiveness, noted many researchers at the roundtable. Educators, they said, should not look solely to single-sex classes or schools to provide a good education.
- **Single-sex educational programs produce positive results for some students in some settings.** However, researchers do not know for certain whether the benefits derive from factors *unique* to single-sex programs, or whether these factors also exist or can be reproduced in coeducational settings.

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- **The long-term impact of single-sex education on girls or boys is unknown.** The absence of longitudinal data on single-sex education in elementary and secondary schools makes it impossible to assess the long-term harm or benefits to any groups of students.
- **No learning environment, single-sex or coed, provides a sure escape from sexism.** Single-sex classes and schools can reinforce stereotypes about men's and women's roles in society just as coeducational programs can.
- **Single-sex education covers so broad a gamut as to defy *most* generalizations.** Included under the broad umbrella of single-sex education are both schoolwide programs and individual classes, programs that are part of the regular school curriculum and programs that take place after the end of the traditional school day, programs that are required as well as programs in which participation is voluntary, and programs to remedy perceived gender inequities along with programs to simultaneously bolster racial and cultural pride. Evaluating the single-sex component of these programs requires considering the different cultural, social, and institutional factors that can influence outcomes in each case.

Scope of the Research

Research on single-sex education at the elementary and secondary level has sought to measure the impact of single-sex classes and schools on student outcomes including academic performance, self-esteem, and attitudes toward academic subject matter, as well students' preferences for single-sex or mixed-sex education.

As participants pointed out, most research conducted in the United States has occurred in Catholic schools or private girls' schools, because only a few public education systems offer single-sex education, and some of these programs are currently facing legal challenges. Thus the research reviewed by Haag and discussed at the roundtable also encompassed studies from such countries as England, Australia, Jamaica, New Zealand, Nigeria, and Thailand that have single-sex public schools.

But the scarcity of single-sex programs in U.S. public schools means researchers have a narrower set of data to draw from in trying to determine whether single-sex education "works" in the United States and for whom.

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The Problem of Defining a 'Good' Education

Recognizing that what constitutes a "good" education lies at the heart of questions about the value of single-sex schooling, the roundtable participants returned throughout the day to a recurrent theme: What constitutes a successful education? How we answer that question, noted participants, has direct bearing on how we evaluate single-sex educational programs.

Researchers agreed that evaluations of the relative "success" of single-sex schooling have been based on traditional measures of academic achievement: grades and standardized tests. Several participants proposed additional or alternative measures. These included a school's success at

- preparing students to participate in democratic deliberation and citizenship (Marks[1]);
- preparing students to assume "adult roles within their communities" and introducing "alternatives to what exists in the community" (Pollard[2]);
- preparing students to work in groups of people with diverse backgrounds, solve semi-structured problems, and support themselves according to their needs (Campbell[3]); and
- preparing students to achieve professional satisfaction, though not necessarily a high income (Warren[4]).

What Accounts for the Successes?

In the discussion of single-sex schools, Valerie Lee of the University of Michigan and Cornelius Riordan of Providence College posited contrasting theories for their findings of positive effects for some students in some single-sex schools.

Lee credited the organizational and administrative characteristics common in single-sex Catholic schools for their "success." Her 1986 analysis of a random sample of students from these schools showed they produced consistent positive effects for girls on attitudes toward academics, course enrollment patterns, achievement, and educational aspirations, compared to coeducational schools drawn from the same data set. Lee found no such differences for boys in single-sex Catholic schools. In independent schools she found no pattern of positive or negative effects in these same areas for girls or boys.

"It's the organizational correlates that go with [Catholic] single-sex schools that make the difference," she argued, not necessarily the fact that they are single-sex. School characteristics associated in Lee's work with both "effective" education and equity include: a curtailed

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all-academic curriculum (fewer course offerings, all of them in academic subjects), smaller schools, a more communal school organization, and more female principals. These are the kinds of features, Lee said, that more schools should be trying to implement.

Calling single-sex schooling "a quick fix" in the quest for equity, Lee said, "If we're trying to make a better world and we think a sex-equitable world is a better world, I'm not sure separating out girls for education is really the way to do it."

Riordan credited positive outcomes to the characteristics of *students* attending single-sex schools. By selecting a single-sex school, he said, students make a pro-academic choice; they disavow the anti-academic youth culture values that permeate coeducational schools. "Students always define schools," he said, "and this definition either affirms or obstructs the structure and organization of schools provided by educators." His studies of students attending single-sex schools have found positive effects on achievement for "disadvantaged students" only (in which group he included non-affluent girls). "My argument is there is an effect but it's conditional," said Riordan. "It only applies to students who are disadvantaged by virtue of their low social class or their low racial or gender status."

The reason? For disadvantaged students, said Riordan, going to a single-sex school constitutes a "pro-academic" choice—a commitment to learning rather than the "youth culture" values of sports, rock music, and anti-intellectualism that he says dominate coed schools. "When a student chooses a single-gender school," Riordan argued, "the students and their parents are defining that school as being a choice away from these non-academic values."

Youth Culture or Male Culture?

Some participants challenged Riordan's interpretation, protesting his "demonization" of youth culture, and drawing a distinction between "youth culture," and "male culture." If the values called into question by some single-sex programs are *male* values, some suggested, this might explain girls' better performance in single-sex schools and classes. Robert Warren of the University of Wisconsin also expressed concern with the notion of "pro-academic choice" because it implies that some students fail because they don't make such a choice.

Carole B. Shmurak of Central Connecticut State University suspected nonetheless that the all-girls or all-boys makeup of the programs described made a positive and palpable difference. Even in a public school, she said, she'd observed "a feeling tone" in a single-sex setting that was absent in

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coed schools. Philadelphia Girls High, an anomaly in that it is an urban, *all-girls' public* school with "something like 90 percent students of color," she said, "felt very much like the independent girls' schools in New England. There was a feeling ... an emotional expressivity that I didn't see in the coed schools."

Jan Streitmatter of the University of Arizona also noted that girls-only classes had produced a "safe environment" in which girls felt free to take risks they were unwilling to take in classes where boys were present.

No Escape From Sexism

Participants underscored that creating a single-sex environment, or selecting a single-sex school, does not necessarily mean that the environment will be free of sexism—that is, a presumption of male superiority—or chosen for reasons of gender equity. Lee noted her research had found that many parents chose single-sex private schools precisely for their "traditional" missions. Leonie Rennie, drawing on her Australian research, agreed, saying, "It is not the case that single-sex classes do not have rampant sexism, because they do." Helen Marks also described persistent sexism in U.S. single-sex classes she observed for a past research project.

Different Goals for Different Students?

In their discussions of single-sex classes, presenters Patricia B. Campbell of Campbell-Kibler Associates, Inc., Ellen Wahl of Education Development Center, Inc., and Diane S. Pollard of the University of Wisconsin-Milwaukee reinforced the complexity of the programs under discussion and opened the area to philosophical debate.

Campbell noted that girls in single-sex programs "with a feminist orientation" appeared to perform better than girls in similar programs where students never explicitly discussed questions of women's and men's relative status in society. But she and Wahl, who collaborated on the paper submitted for the roundtable, didn't speculate aloud on the reasons for this. Instead they focused on broader questions.

Among the provocative questions they raised was one that went to the crux of the debate about single-sex classrooms: Can a good education be considered excellent if it doesn't reach the vast majority of students—girls and boys of all backgrounds, abilities, looks, incomes? Furthermore, asked Wahl, "Does a 'good' education differ for boys and girls?" To which she replied, "I think

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most of us would probably say no. ... But if we ask the question 'Do girls and boys need different things to get a good education?' I think that's where we get to more diversity of opinion."

Examining single-sex education without regard to its social context within a classroom, a school, and the larger society "is dangerous and can lead to short-sighted solutions," she said. Wahl also cast doubt on the value of conducting further studies of single-sex classes, given the "little evidence of differential outcome for effectiveness," and the "questionable legality" of single-sex education.

Campbell agreed that debating "single-sex versus coeducation" before establishing the goals of education was putting the cart before the horse. "What are we looking for in terms of our goals?" she asked. "What do we want either from the schools or the classes? What do we want these kids to look like, to be like? What options do we want them to have?"

A Matter of Culture as Well as Gender

Pollard discussed her five-year research with co-investigator Cheryl Ajirotutu on two African American immersion schools in Milwaukee. Voluntary, after-school, single-sex classes were established at one of the schools. She emphasized the importance of considering multiple aspects of the cultural context when evaluating single-sex education. "When you start looking at some of these gender issues very broadly ... we don't look at how gender issues get played out within specific contexts ... related to race or ethnicity, or social class, [or] often combinations of all those things." We need to take care "not to lose the culture issue when we're talking about gender," she said.

In the Milwaukee single-sex classes, Pollard said, culture was the primary focus. "The entire schools (in Milwaukee) were focusing on trying to improve academic achievement," she explained, "because they began with the assumption that traditional schools had failed to educate this population [of] predominantly poor, African American urban kids." The single-sex classes—some for girls, some for boys—were vehicles to develop "closer interactions with the African American community and African American culture."

Goals of these classes included:

- "developing a greater sense of seamlessness between the school and community" through activities including community members' mentoring of students;
- educating students about the adult roles they will assume as men and women in the African American community;

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- preparing students to "maintain their identity" as they learn to "cope with an oppressive society" by identifying and building on social supports outside the school; and
- investigating sex stereotyping in the culture and in society at large.

While outcome data are still being analyzed, said Pollard, some effects have already been noted. The image of the schools has changed from "a place where people don't want to go" to a desirable place to be. Students have also become aware of issues of sexism and have raised such questions as "why the boys' sports groups go on trips," and "why girls don't get in trouble for doing things the boys perceive as the same things they do."

What Research Tells Us About Single-Sex Classes

There is a wide diversity of opinion among scholars on the broader questions surrounding the value of single-sex classes in the nation's public schools, and, given the limited body of research available, this is unlikely to change in the near future. However, the following points from the AAUW Educational Foundation's November roundtable clarify some issues and summarize some of the participants' key positions.

- **Something about single-sex classes makes them preferred by many girls over coed classes.** Despite some of the inconclusive effects of single-sex classes noted by the assembled scholars, there seems to be a qualitative difference in the single-sex class environment that makes many girls prefer it to a coed class environment. "There is enough discomfort with what is happening in [coed] classes to a significant proportion of girls, that they prefer to leave," said Campbell. Jan Streitmatter of the University of Arizona said that for middle-school girls she has studied, the experience of the "safe environment" of single-sex classes has been "critical ... to their identity development."
- **Single-sex classes can be alternately empowering (because they are a "safe" place for learning and discussion) or oppressing (because they may reinforce sex stereotypes).** Perceptions may vary with the identity of the observer, noted Leonie Rennie of Curtin University of Technology in Australia. Some girls see the classes as a refuge from boys' intimidation. But in the absence of girls, some boys—especially those who are less socially adept—find themselves getting picked on in girls' place.

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- **Single-sex classes have effects on other classrooms.** In some cases, single-sex classes may disrupt a school environment by siphoning off students from coed classes and skewing the sex ratio in those classes. Said Lee, "What [a single-sex class] does to the rest of the school is sometimes not even really thought of. As soon as you draw off some girls in math and science into all-girls' classes, you actually skew the gender balance in the so-called coeducational classes to some degree. . . ." Rennie noted that single-sex classes can also create hierarchies or enmity between teachers who do or don't want to teach either girls or boys.
- **The appeal of single-sex classes to policymakers often has little to do with the classes' effectiveness.** Said Wahl, single-sex classes tend to "relieve pressure on the system" without necessarily making substantive changes. Speaking about an Australian initiative, Rennie said, "I don't think it would be cynical to say that the Education Department supported the introduction of single-sex classes in schools where teachers wanted it to happen. It was a political move. . . . An election was coming up and it looked as if something was actually going to be done in education but it wasn't going to cost anything." Several researchers agreed that simply creating single-sex classes, without providing for teacher training or other support, would probably not be enough to create meaningful change.

Future Directions for Research

Among the suggestions for further research in single-sex education made by various roundtable participants were the following:

1. Research on single-sex education to date has assessed a relatively limited range of outcomes, which are primarily academic or related to income. Other types of outcomes—including the ability to cope and function in society, development of leadership qualities, and career development—need to be defined at the outset and measured as an integral part of future research projects.
2. There is a need for more complex examinations of factors that promote effective education. Some of these could be panel, cohort, or staggered studies to chart populations that move through high school in four years.
3. To remove selection bias, studies should compare the performance of like students randomly selected for single-sex and coed learning environments, said some participants. Others pointed out that random selection is difficult, if not impossible, to implement in public school systems.
4. There is a need to explore whether what has been learned about education in a single-sex environment can be applied to improve coeducation.

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Some Final Words

The roundtable generated a rich, lively discussion on what is known about single-sex educational programs, based on the data available, and delineated many possible areas of further inquiry.

The roundtable also raised several profound, unanswered questions about this research and about the concept of single-sex education. Among these questions are:

- Even if girls and boys do not have different learning styles, are there other reasons—social or cultural, for example—that suggest that they may need to follow different paths to achieving the same educational goals? If so, what are these paths?
- If society truly values diversity and equity, is it possible to justify a path to educational success that is based purely on the student's biological sex?
- Is single-sex education a short-sighted "quick fix" advocated more often for political reasons than for educational ones?
- Should educators or researchers continue to invest their efforts in defining or refining a strategy—single-sex education—that is of questionable legality?

Notes

1. Helen Marks, Ohio State University.
2. Diane Pollard, University of Wisconsin.
3. Pat Campbell, Campbell-Kibler Associates. Campbell here cites Richard J. Murnane and Frank Levy, *Teaching the New Basic Skills: Principles for Educating Children to Thrive in a Changing Economy* (New York: Free Press).
4. Robert Warren, University of Wisconsin.

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Literature Review

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Single-Sex Education in Grades K-12: What Does the Research Tell Us?

Pamela Haag

Interest in single-sex classes and schools has been reinvigorated by the educational reform movement and by skepticism that the coeducational environment is genuinely coeducational—that it fosters equitable treatment of boys and girls. When the U.S. Department of Education sponsored a roundtable on K-12 single-sex education in 1992, participants concurred that although "instructional ideas that emerge from single-sex schools have relevance for educators working in coeducational environments ... the discussion about single-sex education frequently pits those in coeducational and single-sex schools against each other in a dichotomy that essentially falsifies their real interests and intent."[1]

This "pro" or "con" stance toward single-sex education still shapes much of the popular literature on the subject, but is misleading from a research perspective. First, single-sex learning has been inspired by several different—sometimes opposing—ideological and social contexts, especially in the last decade. Some feminists have advocated experimental single-sex environments because they may minimize the deleterious effects of gender stereotypes (for example, the notion that math is a masculine subject). On the other hand, advocates of African American "immersion schools" or academies[2] that have emerged in the last four years sometimes champion single-sex programs for the degree to which they reinforce students in normative—and traditional—gender roles.

Carol Ascher (1992), for example, summarizes the shared qualities of African American schools and programs by noting that "their content and structure ... emanate from a belief in the importance of gender differences." The programs, according to Ascher, all include "appropriate role models of the same sex" and "female and male initiation rites." From another perspective, parents and students sometimes choose single-sex private schools for girls because of their more traditional mission statements. These schools, as Peter Carpenter (1987) asserts, to some extent

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certify *class* privileges. Each of these constituencies may advocate the same *practice*—single-sex education—but do so for notably different reasons and goals. As Lyn Yates (1993) notes, "sex mix ... is not a physical variable that has a simple effect, but one whose effect is shaped non-uniformly in different types of school cultures." The structure of single-sex education, in other words, does not in and of itself ensure any particular outcomes, positive or negative, because it has multiple inspirations and forms.[3]

Assessments of single-sex education's "success" or "failure," therefore, are contingent on the goals of the stakeholders. The indicators by which research measures effects—and schools measure "success"—vary accordingly. For example, James Macfarlane's (1985) study of single-sex math classes asked, "Do segregated classes change the participation rates of male and female students?" He measured the success of the program, in part, by the extent to which it bolstered subsequent math participation for girls. In contrast, the Illinois Academy (1994) evaluated single-sex math classes by asking, among other questions, "Is a single-sex section an effective way to enhance the subsequent coeducational class achievement" of its participants? Here, the measure of success is math achievement for girls who persist, regardless of their number. As these examples show, researchers select different outcomes and indicators based on their hypotheses of what single-sex education can do for students.[4] If the primary concern is preventing dropouts or reducing teen pregnancy rates, single-sex programs may be judged successful even if they do not appreciably bolster academic performance. But if the primary concern is science uptake or college admission rates, then indicators of success or failure will be more closely tied to academic achievement.[5]

It is also difficult to compare research about the effectiveness of single-sex programs across historical contexts. In 1996 Cornelius Riordan observed, "The more that [single-sex] schools remain rare and special, the more effective they will be" for the minority of students who select them. His analysis suggests that the benefits of single-sex public schools may not persist if such schools become more prevalent; their advantages are related to their singularity. Likewise, coed schools' attention to gender equity since the early 1990s may diminish the relative advantages of single-sex education observed today, compared to those observed in the 1970s or early 1980s.[6]

The disparate contexts, programs, and school types grouped under single-sex education—as well as differing research conditions—complicate statistical analysis of single-sex education's effects, by any indicator. Perhaps the most troublesome obstacle in single-sex research is selection bias, which Valerie Lee and Marlaine Lockheed (1990) call a "social phenomenon and a statistical nuisance." Students for the most part cannot be assigned randomly to single- or mixed-sex environments, so researchers must carefully control for background variables such as

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socioeconomic status that would skew their results. The possibility of selection bias is especially profound in the United States, where single-sex schools are overwhelmingly private. Do students achieve because of a school's sex composition or because the schools draw from economically and educationally privileged populations? Several studies reviewed in this essay applied statistical controls for students' prior academic abilities as determined through standardized tests or grades; family and social background variables such as socioeconomic status, parents' education, and father's occupation; and school variables such as curriculum track and teacher training. Some studies that introduced no controls assert that the populations they compare are sufficiently homogeneous to mitigate selection bias.[7]

Cause and effect pose a second major research challenge in single-sex education. When a single-sex school works, *why* does it work? Does a single-sex environment in and of itself produce certain outcomes or do these outcomes result from other factors *indirectly* associated with single-sex schools—such as class size, teacher preparation, and administration practices? The cause and effect question has particular relevance, of course, for policymakers or practitioners who hope to duplicate certain single-sex advantages for girls in the coeducational environment.

The variety of inspirations, desired outcomes, and sociocultural contexts for single-sex education, in summary, make it difficult to answer the question, "Does single-sex education work better for girls?" Instead, some researchers view single-sex contexts, in Lee's (1992) phrase, as "a source of pedagogical insight" or "laboratories" that may inform and improve the coeducational environment. Researchers like Emmanuel Jimenez ask, "What do single-sex and coeducational schools actually do that is different?" Others, including Valerie Lee, approach the research project with an eye to learning what properties contribute to the success or failure of the single-sex school.[8]

This essay will review the research[9] on K-12 single-sex schools and classes with particular attention to effects on girls.[10] Although researchers agree that findings on the subject have been inconsistent overall, exhibiting a "now-you-see-it-now-you-don't effect" that is both "tantalizing and frustrating," according to Judith Gill, this essay will emphasize findings on specific outcomes about which researchers share some agreement. The first section, summarizing research on single-sex education and attitudinal variables, looks at self-esteem, subject preference, sex stereotyping, and, finally, "environment" issues. The second section, which explores achievement variables, examines two groups of studies: those that show few or no effects by school type (coed or single sex), and those that interpret positive effects as a result of school type. Where possible, special emphasis will be placed on single-sex *classes*—particularly classes in math and science, the focus of many recent pilot programs aimed at boosting girls' performance in grades K-12.

Unfortunately, much of the literature here is anecdotal, with numerous "reports of individual experiences that are neither based on nor informed by qualitative research methodology," as Gaell Hildebrand notes. According to a 1996 review, single-sex classes have been proliferating "at a rate well ahead of the research evidence on which its success, or otherwise, could be determined." Because sound published research on single-sex classes is sparse, this review supplements articles on the topic with notable unpublished papers delivered at conferences.[11]

Finally, this review does not limit itself to U.S. studies because so much of the signal work on single-sex education has been conducted in countries like England, New Zealand, Australia, Thailand, Jamaica, and Nigeria that offer single-sex public schools. Although these studies frequently reflect a distinct cultural and economic context, their findings offer insights into the outcomes American educators might expect were they to institute public school forms of single-sex education. Since the United States has so few public single-sex schools or programs at present, research insights from countries rich in public single-sex schools may in some ways be more pertinent for comparison than evidence from private single-sex schools within the United States.

Section 1: Attitudinal and Environment Variables

Self-esteem

Although many researchers question the inherent value of "self-esteem" as an independent outcome or educational goal, a few published studies have tested the popular wisdom that girls in single-sex schools have a higher self-concept. Interestingly, studies that found higher "self-esteem" for girls in the single-sex environment used a multidimensional measure comprising such subcategories as academic, athletic, and social esteem. Levels of esteem in specific domains (that is, academic achievement or physical appearance) may differ by school type, these studies concluded.

Cairns (1990) investigated self-esteem and locus of control (an individual's sense of how environment hinders or facilitates her/his goals) for 2,295 students in 76 secondary and academically oriented "grammar" schools in Northern Ireland. Departing from earlier studies by Foon (1988) and Lee and Bryk (1986), he applied a multidimensional measure of "self-esteem" comprising four subcategories—social, cognitive, athletic, and general—to create a subtler portrait of the interaction between school type and attitudes. After conducting an analysis of variance by gender and school type for each separate kind of school (secondary and grammar), Cairns concluded that "for the third time, and in a third culture, . . . single-sex schools are associated with benefits in terms of self-esteem and locus of control." He cautioned, however, that

his findings of higher esteem may be confined to the domain of cognitive self-concept and to the context of academically oriented single-sex grammar schools.[12]

Granleese and Joseph (1993), also investigating Northern Ireland, hypothesized that "gender intensification"—sex role rigidity—would be strongest in a mixed-sex social environment for adolescent girls. Like Cairns, Granleese and Joseph deployed a domain-specific self-concept measure in their study of 167 girls from two Belfast secondary schools—one single-sex and the other coed—matched for location and religious affiliation. The authors discovered that girls at the single-sex school were less critical of their own behavioral conduct—the single best predictor of "global" (overall) self-worth in the all-girl's school—than were girls at the mixed-sex school, where physical appearance was the single best predictor of degree of global self-worth. They concluded that "although scores on global self worth may not be any different between girls from single-sex and mixed-sex schools, the *determinants* of global self-worth afe."[13]

Self-esteem studies that do not find positive effects on girls of single-sex education indirectly support Granleese and Joseph's conclusion: They tend to analyze general self-concept rather than its specific components, and find no overall benefit by school type. **Foon (1988)** surveyed 1,675 secondary students in 16 nongovernmental (private) coed and single-sex schools in Australia to gauge the effects of school type on general self-esteem, performance, and subject preferences. She found no significant differences in self-esteem between girls from mixed and single-sex schools, although she reported higher self-esteem for *boys* attending single-sex schools.[14]

Brutsaert and Bracke (1994) found little effect of school type in their study, which measured the "general well-being" of 2,095 sixth grade students in 60 private Belgian elementary schools. This study defined well-being as "adjustment to school life as reflected by affective outcomes" such as "self-esteem, sense of mastery [and] sense of belonging." After controlling for students' socioeconomic status and size of school, and performing a stepwise multivariate regression analysis,[15] Brutsaert concluded that, at least on the elementary school level, "girls do not seem to be influenced in any way by the gender organization of the school." Boys, in contrast, are negatively affected not by the gender composition of the student population, but by a preponderance of female teachers on staff, which lowers boys' overall sense of well-being. This study underscores the importance of considering students' grade level and the sex composition of the *staff* in assessing the effects of sex organization on outcomes such as esteem.[16]

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Smith (1996) conducted a longitudinal study over a 10-year period, investigating students' attitudes and achievement in one all-boys' and one all-girls' high school in Australia that had transitioned to coeducation (N=1,300). Both girls' and boys' self-concept, measured by the Marsh Self-Description Questionnaire II, declined initially during the transition but after five years increased to a level above that which was measured when the students were in single-sex classrooms.[1]

Taken as a whole, studies of girls' self-esteem as affected by school type suggest that the sources of esteem for girls may differ in single-sex and coeducational schools. Two published studies that argue for self-esteem gains for girls in single-sex schools point to higher degrees of *cognitive* self-worth and freer *behavioral conduct*. Studies have not shown a significant interaction of school type and *general* or overall self-concept. In other words, neither school type has been shown in these studies to generate a greater quantity of overall esteem for girls, although a specific source of esteem—for example, appearance or athletic skill—may differ for girls in single-sex and coed schools.

Attitudes toward academic subjects

There is something of a consensus that girls in single-sex schools tend to perceive subjects such as math and physics as less "masculine" and may have stronger preferences for them than their coeducated peers. The consistency of this finding in a variety of single-sex schools suggests that it may be a factor intrinsic to the single-sex environment rather than a characteristic of educational practices or policies indirectly associated with these schools. However, more research is needed to ascertain such cause-and-effect relationships. None of the attitude studies reviewed here comments on single-sex classes.

Published studies that use subject preferences and girls' attitudes toward math and science as indicators have concluded uniformly that single-sex environments have a positive effect for girls. Girls in these environments rate fields such as physics as less masculine than do their coeducational counterparts. Foon notes that students attending single-sex schools "seem to be less rigidly attached to traditional views about the appropriateness of subject areas by sex." Females, in particular, she found, were more likely to prefer science in single-sex than the coed schools. **Vockell and Lobonc (1981)**, in one of the first studies of coeducation and subject preference, administered a questionnaire to 476 non-coed and 280 coed juniors and seniors in U.S. high schools. They found that "non-coed girls rated physical sciences as less masculine than the coed girls." No distinctions by school type were evident in the ratings of the biological sciences. Subsequent studies in other cultures have generated similar findings. **Stables (1990)** surveyed more than 2,300 British comprehensive (public) school students (ages 13-14), asking them to

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weigh the importance of school subjects and rank subjects by preference. Stables found no differences in the perception of subject importance by sex and school type, but consistent, significant sex differences on every attitude section. These differences were greater among coeducated students. Single-sex education, he concluded, "tends to reduce polarization of attitudes between the sexes generally, but especially regarding physics, where the polarization is particularly marked in the mixed-sex schools."[18]

Two more recent studies have found single-sex schools exerting a significant effect on girls' subject preferences, and have refined the factors that seem to influence positively girls' attitudes toward the sciences. **Mallam (1993)** found that students in all-girls Nigerian schools favored math more than girls in coed Nigerian public boarding schools. She found the highest percent of positive attitudes in all-girls' schools where mathematics was taught by female teachers. Finally, **Colley et al. (1994)** in Britain administered a survey asking students to rank their school subject preferences. Their database included 648 students aged 11-12 years, and 485 students aged 15-16 from three single-sex girls' schools, four single-sex boys' schools, and four public coeducational schools. In the younger age group, girls from single-sex schools showed much stronger preferences than their coed peers for such stereotypically "masculine" subjects as mathematics and science. Young boys from single-sex schools similarly showed stronger preferences for such stereotypically "feminine" subjects as music and art. Among older pupils, however, gender rather than school type accounted for most differences.[19]

Degree of "sex stereotyping"

Despite the fairly uniform findings showing girls' stronger preferences for less "traditional" subjects in single-sex schools, published research that examines sex roles and stereotyping more generally has found no consistent relationship between school type and degrees of sex stereotyping.

Two studies used the "Attitudes Toward Women" scale[20] to measure respondents' views of the sexes and gender-appropriate "social behavior." **Harris (1986)** surveyed 538 first-year students in an Australian university psychology class, two-thirds of which was female. Her findings, when analyzed by gender and school type, did "not support the hypothesis that either a single-sex or a coeducational school is more likely to foster traditional sex role stereotypes." **Signorella and Frieze's (1996)** longitudinal study of a U.S. private school transitioning to coeducation found a lessening of sex role cliches over time in all grades, but no indication that class type (single-sex or coed) influenced the degree of stereotyping. The findings, although based on a small sample, "show no consistent tendency for students in single-sex classrooms to display less gender stereotyping," conclude the authors.[21]

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Lee and Marks (1994) found that sex stereotyping, albeit of different sorts, occurs with as much frequency in the single-sex context as in the coeducational. After analyzing data from surveys, school records, class observations, and interviews from 66 classrooms in 21 schools, the authors found that no school was entirely free of sexism. "Gender reinforcement and embedded discrimination" were evident in all three types of schools (girls', boys', and coeducational), yet were more common in single-sex schools. "Gender domination and active discrimination of females," which Lee notes "can only occur in environments in which both sexes are present," were common in coeducational schools. Surprisingly, 66 percent of all the sexist incidents in the coeducational classrooms occurred in chemistry classes, although those classes constituted only 20 percent of the observations. This "localization of sexism in coeducational schools to physical science classes," the study notes, "is striking," especially in comparison to the unremarkable nature of these classes in the girls' schools.[22]

Lee and Marks conclude that "strong policies [insisting] on the equitable treatment of male and female students make a difference" in the degree of sex stereotyping found in schools. But the mere separation of girls and boys appears not to diminish the extent to which gender roles are reinforced. **Gill (1996)**, in an overview of single-sex environments in New Zealand, also submits that "teacher awareness is of much more significance than school gender context in producing or overcoming stereotypical gender limitations on students."[23]

Recent popular commentary on single-sex education sometimes informally assumes that single-sex environments by their nature diminish sex stereotyping. This assumption confuses "sex" and "gender."[24] Single-sex schools have either all-male or all-female student populations, yet the reproduction of gender roles—cultural norms of "masculine" and "feminine" behavior—can occur in a single-sex as well as a mixed-sex environment. Boys in an all-male school, for example, may assume the highly gendered role of the "sissy," conversely, girls in all-female environments may nonetheless be "trained" or schooled in feminine norms just as surely as girls in coeducational environments, as Lee and Marks' work underscores. Sound teacher training seems to offer promise of reducing sex stereotyping in both the coed and single-sex environment.

The "environment" question

Three studies agree that single-sex environments are perceived by students to have higher levels of "order," control, and "organization." But the studies diverge in their assessments of whether students find single-sex settings to be more "affiliative," "involving," or pleasant than the coed environment.

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Two of the formative early works on school type—Dale's multi-volume *Mixed or Single-Sex School?* (1969) and Coleman's *The Adolescent Society* (1961)—examined coed and single-sex "environments" in terms of how well they satisfied students. Dale's work, which became a research basis for the shift toward coeducation in the late 1960s, administered a questionnaire to thousands of former British secondary school students. He found that students "preferred" a coed environment over single-sex schools, which in their perception overemphasized academic work and academic success. Arguing that schools should act as microcosms of society, Dale endorsed coeducation on the strength of its more "natural" environment for students. Coleman, in contrast, surveyed the American coeducational landscape and concluded that the schools constituted an "adolescent subculture," a contained world of social interactions governed by "cars and the cruel jungle of rating and dating" rather than interest in either academic achievement or social adjustment. Countering Dale's study, Coleman speculated that single-sex schools provided a more effective environment for education because they diminished somewhat the "competition for adolescent energies" apparent in the coed "subculture."[25]

Two published studies by **Trickett et al.** and **Schneider and Coutts (1982)** revisited the debate over the relative merits of school environment. Both studies agreed that students perceive the environments to be distinct. Trickett et al. used data from 456 randomly selected grade 10 and 12 students in 15 representative U.S. single-sex and coeducational boarding schools to gauge environmental differences between school type, as measured by a Classroom Environment Scale survey. Single-sex schools, Trickett concluded, enjoyed higher levels of student involvement, affiliation among students, task orientation, competition, organization, and teacher control than coed schools. Trickett did not analyze his data by sex. In the same year Schneider et al. surveyed 2,029 grade 10 and 12 students in 13 Canadian private coeducational and single-sex schools using the "High School Characteristics Index."[26] In contrast to Trickett, Schneider and Coutts concluded that students perceive "coeducational schools as placing greater emphasis than single-sex schools on affiliation and . . . nonacademic activities." Schneider and Coutts, who analyzed their data by school type, grade, and sex, found that girls and boys in single-sex schools both perceive their schools to place greater emphasis on discipline, but the researchers did not speculate on how this might affect achievement. The two studies concur that students perceive single-sex schools to have greater "authority structure" and "order" (Trickett) and "greater emphasis on control and discipline" (Schneider and Coutts). In 1988 Schneider et al. revisited the school environment issues, using the same student population, in a study that gleaned through an "attitudes" questionnaire that "the majority of male *and female* students from both school types . . . reported a preference for coeducation."[27]

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A study by **Gierl (1994)** that deployed the "Classroom Environment Scale" in an all-girls' classroom setting argues, contrary to Schneider (1988), that girls have more positive perceptions of—and preferences for—the single-sex classroom. Gierl sought the "intrinsic characteristics" of a single-sex 11th-grade physics class in a U.S. Catholic school. Comparing data from four groups—girls in an all-girls' class and a mixed-sex class, and boys in an all-boys class and a mixed-sex class—he discovered negligible differences in final marks. Yet he found that "females in the single-sex class reported that Physics 20 was more involving than Physics 10 [the mixed-sex class] when compared to males in the single-sex class and males in the mixed-sex class." Females perceived the class to be more affiliative and to have higher levels of "order and organization," and "had a stronger preference" for the "gender-specific context."[18]

Further research might pinpoint the school or classroom-level characteristics that encourage the perception of a more orderly learning environment in the single-sex school. These practices may prove adaptable to the coeducational classroom. In any event, there is no necessary relationship between *perceptions* of environment and achievement, as the next section will elaborate.

Section 2: Achievement Variables—Single-Sex Classes and Single-Sex Schools

Single-sex classes and their effect on achievement outcomes for girls

There is very little research at this point on single-sex classes, and enthusiasm is high for implementing programs on an experimental basis and gathering evidence to move beyond anecdotal assessment. The fledgling body of research on single-sex classes has yielded relatively consistent findings. Whereas girls perceive the classrooms in many cases to be superior, and may register gains in confidence, these benefits have not translated into measured improvements in achievement. Some studies, in fact, report diminished achievement for girls in single-sex classrooms. A few studies that look more specifically at teacher training and peer interaction have identified these factors as more crucial to creating a positive learning environment than classroom sex composition.

Girls' documented preferences for single-sex classes have not yet translated into corresponding gains in achievement. Studies that attempt to assess the effects of single-sex schools and classes on achievement—whether through grades, test scores, or standardized aptitude tests—have so far found few correlations between the two. Although they often recommend the continuation of single-sex classes as an important experiment that has not produced negative effects, studies of single-sex classes to date have fairly consistently documented a paradox. Girls' higher estimations of single-sex math and science classes come in the absence of any accompanying achievement gains.

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One of the early studies of single-sex classes by **Macfarlane and Crawford (1985)** illustrates the attitude/achievement paradox. Macfarlane analyzed data from the first year of a longitudinal study of sex-segregated mathematics classes in Ontario on several attitudinal and achievement measures. The sample included grade 10-13 students and a control group from a school of similar socioeconomic status. Macfarlane found that after the first year, "students' responses indicate ... that while there were some changes in the attitudes of students [in the single-sex classes], they did not differ significantly from the changes in the attitudes of students at the comparison school. This would tend to suggest that the segregated classes had no significant effect on students' attitudes as measured by the Mathematics Attitudes Scales." Twenty-five percent of all students in the single-sex classes self-reported that the classes had "improved their attitudes, with females responding more positively than males." Achievement gains, however, were "not so much evident with respect to actual marks and test scores," despite students' perceptions of higher performance. In fact, marks of students in the single-sex classes fell significantly from grades 9 to 10 while those of students at the comparison school remained stable. There was no difference between the scores of the schools on the Canadian Achievement Test math portion. Generally, students reported more dramatic attitude changes than test scores or attitude scales otherwise indicated.[29]

In the same year **Harvey (1985)** evaluated science test results of 2,900 students in 17 secondary schools in England—two coed schools with single-sex science classes, six coed schools with coed science classes, six all-girls schools, and three all-boys schools. Harvey controlled for identical verbal reasoning scores on standardized tests. His results indicated that there was no advantage to teaching students in single-sex science groups, that girls in coed schools perform better in science than girls in single-sex schools, and that no difference was apparent between boys in coed and boys in single-sex schools.[30]

Rowe (1988) wanted to determine the "extent to which ... establishing single-sex classes in a coeducational postprimary school [was] effective in improving students' mathematics achievement and confidence, as well as their subsequent participation" in math. Through a sample of 398 middle-school students randomly allocated to single-sex and mixed-sex classes at one Australian middle school, Rowe found that for the "intact groups"—those students who remained in either a coed or single-sex class—students in single-sex classes registered consistently higher gains in confidence than those in mixed-sex classes. Among the "shift group"—those students who, because of scheduling constraints, moved from single-sex to mixed-sex classes—Rowe found that confidence scores declined, "significantly so" for girls. Although higher confidence was associated statistically with achievement and greater rates of persistence in advanced mathematics classes for

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girls, Rowe reported no significant differences in mathematics achievement per se. The change in students' mathematics achievement over time, he discovered, "independent of confidence, was similar for all students, regardless of class type." Confidence gains observed in the single-sex classes for girls did not relate directly to achievement gains."

Leder and Forgasz (1994) gathered both qualitative and quantitative data—attitudinal and performance measures—to better integrate into their study the many factors that influence achievement. Comparing performance data on roughly 160 Australian students—half of them boys and half, girls—in grade 8 single-sex math classes (male and female) and two coed math classes, the study found no significant differences for females by class grouping, much as Macfarlane had shown earlier. The study also confirmed Forgasz's 1993 research on achievement, which found "gender differences" in the scores of 7th-grade boys and girls in coed schools, "irrespective of" the class type in which they learned. Furthermore, the differences in the scores of males in mixed and single-sex settings were greater than between corresponding groups of females. Leder and Forgasz echo other studies of single-sex schools in noting that some student beliefs and stereotypes about math persisted "or were more pronounced at the end of the year." However, both female students and their mothers were more "favorably inclined toward the single-sex mathematics program than were their male counterparts." The authors conclude that the study did not provide "unequivocal evidence" that single-sex math classes per se address gender differences in mathematics learning outcomes, but the study does confirm an overall preference among female students for the single-sex classroom environment."

Of related interest are a few studies of sex ratios in the classroom and their effects. **Webb (1984)**, interested in both interaction and achievement outcomes, administered tests in mathematical reasoning ability at the beginning and end of the school year to 77 students in two junior high schools. Over the course of the year, the students worked for a period of time in majority male, majority female, or equal male-female groups. She then analyzed transcripts of group work. Webb did not simply document the quantity of interactions by sex, but scrutinized their substance, classifying comments into six positive and negative categories. The categories are: asks for explanation and does not receive one, asks for explanation and receives one, asks for procedural information and receives it, and so on. "The major result in the patterns of same-sex and cross-sex interaction in majority female groups," she concluded, was that females asked the males for explanations much more often than would be predicted on the basis of the males' numbers in the group. "In groups with two females and two males, a striking result is that when females asked males for explanations, only 7 percent of their requests were granted. In contrast, females responded to 70 percent of the males' requests." Webb concludes that decreasing the number of

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males, ironically, results in a greater focus on the males in the group, and that girls amassed more "negative" interactions—for example, they more frequently asked for information and did not receive it. Webb's study validates one of the rationales for single-sex classes for math and science: girls' perceived disadvantage in attracting classroom attention in a mixed-sex group."

Workman's (1990) study of a 10-week experiment with single-sex groupings in two Northern California high school geometry classes found, again, no differences in performance between the single-sex and mixed-sex groups. Many students felt they learned less in the single-sex groups, although they did not elaborate why. Teachers noted that the groups that worked best together were those in which some members were friends and/or a member "was one of the brighter students in the class," regardless of the sex composition of the grouping.[14]

Parker and Rennie (1986), investigating single-sex groupings in Australia, similarly concluded that effects extrinsic to the sex composition of the class may account for girls' perceptions of an improved atmosphere and interactive environment in the single-sex class. They designed an in-service program involving 20 teachers to facilitate a nonsexist approach to teaching. All teachers were given special help to increase their confidence in teaching the subject unit on electricity, yet half of the teachers (the experimental group) were also exposed to a program to alert them to sexist patterns in the classroom. The authors found that in the experimental classes, "boys and girls in mixed-sex and single-sex groups exhibited the same pattern of activity, whereas the control classes showed behavior differences in the mixed-sex group." Hence, teacher training in nonsexist approaches seemed to foster the same positive results in the coed context as those observed in the single-sex control group. Parker and Rennie concluded that teachers can be made aware of sexism and trained to improve their classroom style but that, in areas where teachers have a "low level of awareness" or skills, single-sex groupings may benefit girls' science education."

Gaell Hildebrand (1996), skeptical of single-sex initiatives in Australia, argues that single-sex classes often give the appearance that a school system is "doing something" about gender equity "without [changing] any of the . . . ways that gender is socially constructed in schools."[16] In a policy review, **Parker and Rennie (1996)** assert that the implementation of single-sex classes is not "a cost-neutral innovation. [Administrators] must be prepared . . . to resource the change, especially through the provision of professional development support." The placement of students in single-sex classes, they argue, "created environments in which teachers could address some of the apparent shortcomings of the students' previous education. . . . Where teachers had, or were prepared to develop, strategies . . . these shortcomings were addressed effectively."

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Achievement in single-sex schools: Studies that do not show differences attributed to school type

Research findings are more ambiguous concerning the effects of single-sex schools on girls' achievement. This section will review studies that have found limited or no positive effects for girls in single-sex schools. The next will examine studies that do attribute some positive outcomes to school type.

While most of the studies summarized here did find uncorrected or "raw" gaps favoring girls in single-sex schools, once findings were adjusted for socioeconomic or ability variables, these differences diminished. The studies suggest that the selectivity of most single-sex schools and/or the socioeconomic status of students who attend such schools account for most differences in achievement between single-sex and coeducational contexts.

Finn's (1980) descriptive study[37] of examination results in the United States, Sweden, and Britain confirmed that "patterns of sex differences are remarkably similar across the three countries, especially in coeducational schools." Yet he found "little if any correlation of school characteristics with distinctions between boys' and girls' achievement profiles." That is, none of the school characteristics selected or background features (Finn controlled for socioeconomic status, family size, and parents' education) mediated large discrepancies "between male and female students in terms of verbal and science achievement." In England's single-sex school population, Finn did discover a smaller gap between boys' and girls' performance, but did not feel confident in ascribing the trend to the effects of school type. A hypothesis for future research, he proposed, would be that female teachers and peers may facilitate girls' learning in British single-sex schools.[38]

Steedman (1983) also utilized a large database (those born in Great Britain in a particular week in 1958 who participated in the National Child Development Study) and performance on standardized general exams. She controlled for both parents' educational level, the father's occupation, and the selectivity of the school. She further controlled for pre-existing differences in academic achievement as indicated by primary school attainment at ages 7 and 11. Steedman found that with a few exceptions (French language scores), differences in examination results were not explained by school type once discrepancies at intake were considered.[39]

Bell (1989) hypothesized that the degree of competitiveness of single-sex schools—how elite they are—has been overlooked in analyses of their effectiveness. Working with an Assessment Performance Unit test for British students at ages 11, 13, and 15, Bell found no "evidence of difference between the two types of schools" once "selective schools" were removed from the

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sample. "When no allowance is made for the type of school"—meaning here, its degree of selectivity—"there are large differences between the subcategory performance between single-sex and mixed schools for each sex of pupil. However, these results do not indicate that single-sex schooling is more effective than mixed schooling but reflect the fact that a greater proportion of the single-sex schools are independent or grammar with pupil selection policies."[40]

It is difficult to identify or analyze the effects of school type because this macro variable interacts with population variables, such as an individual's socioeconomic status prior to enrolling in the school. Because students are "nested" within schools and communities, variables relevant to populations interact with school type level variables to influence outcomes. A more sophisticated statistical technique, Hierarchical Linear Modeling (HLM), allows researchers to control simultaneously for variables at both the school level (for example, school type) and student population level (for example, socioeconomic status or parental background).

Two recent studies that apply HLM to the single-sex education question have not found significant school type effects. **Young and Fraser (1992)** analyzed a stratified random sample of 4,917 students from 233 Australian schools. They used HLM to determine which factors account for differences—confirmed in the first stage of the analysis—between girls' and boys' physics achievement. The percentage of explained variance in physics achievement within schools was 88 percent and between schools was 12 percent. In other words, Young and Fraser found a great deal of "between-schools" (single-sex versus coed) variance that was not explained by factors such as a student's attitude toward science, the occupation of his or her parents, and the numbers of books in the student's home. Further investigations were then made into between-school variables. Sex composition—whether single-sex or mixed—of the school reduced between-school variance only marginally (by 7 percent), the addition of school type (Catholic, independent, government) caused a more substantial reduction in between-schools variance (15 percent). However, when the average socioeconomic level of the students within the school (an aggregate variable) was included in the model, the drop in unexplained between-school variance was more dramatic (41 percent). "This variable appeared to swamp the effects of sex composition of the school and school type, with the inclusion of the latter not significantly reducing the unexplained between-schools variance," Young and Fraser observe. They conclude that what influences student performance in physics is the average socioeconomic status of the students attending the school and not the school's sex composition.[41]

More recently, **Harker and Nash (1997)** use data gathered in a longitudinal study of more than 5,000 8th-grade equivalent students in New Zealand, and utilized HLM to control simultaneously

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for individual characteristics (for example, socioeconomic status) and school type characteristics. As with other studies, Harker confirmed statistically significant raw differences in favor of girls at single-sex schools in the data. Yet after applying controls for ability levels, social and ethnic backgrounds, and mix at the two types of school, he observed that "initial significant differences between them disappear." The "difference in average academic attainment of girls who attend single-sex as against coeducational schools is more apparent than real," he finds. "When it comes to policy options that might be seen as emerging from the data, it would seem that school type is not an important factor in ... [improving] the performance level of girls in math and science."[42]

In another recent study, **LePore and Warren (1997)** used the National Educational Longitudinal Study of 1988 to test three hypotheses: first, that boys and girls who attend single-sex Catholic secondary schools score higher on tests of achievement and self-concept than their counterparts in Catholic mixed-sex schools; second, that any advantages are especially powerful for female students; and, third, that these advantages can be explained by pre-enrollment differences in learning between students. The researchers found that "boys in single-sex schools do not increase their test scores any more than boys in coeducational schools," although they may score higher on achievement tests. For girls, they conclude, "nowhere did we find statistically significant positive effects of single-sex school enrollment for girls .... We find no evidence that single-sex Catholic school boys or girls learn more than their coeducational Catholic school peers during high school."

LePore and Warren speculate that their findings differ from those of Lee and Bryk (1986) [see next section, "Achievement in Single-Sex Schools: Studies that Show Some Positive Effects"] in part because something about Catholic schools may have changed from the 1980 "High School and Beyond"[43] data utilized in the 1986 study. They further speculate that the "advantage" associated with enrollment in a single-sex secondary school may have dwindled after coed schools addressed gender bias issues spotlighted in the 1980s.[44]

Achievement in single-sex schools: Studies that show some positive effects

Studies that have discovered positive achievement outcomes attributable to the single-sex environment have all dealt with single-sex schools rather than classes.

Hamilton's (1985) descriptive study of 1,146 boys and girls—representing 14 percent of the grade 11 high school population of Jamaica—used scores on the standardized general certificate exam to compare achievement across school type. Hamilton did not control for background variables, but drew from elite and non-elite schools to ensure a more representative sample. She

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found that boys *and* girls from single-sex institutions performed "significantly better" than their counterparts in coed schools.[45]

Jimenez and Lockheed's (1989) study of mathematics performance in Thailand asks, "Would a student, randomly chosen from the general population, do better in a coeducational or in a single-sex school, and are the effects similar for male and female students?" Jimenez, concerned about selection bias, ran a regression to identify the most common background variables associated with the selection of single-sex schools. For girls, these variables included maternal education, educational expectations, home language, and private school choice. Having established predictors for single-sex school choice, Jimenez applied a Heckman two-step methodology[46] to correct for student background and selection bias and therefore more accurately discern whether students in single-sex schools have an achievement advantage. Jimenez discovered that a Thai eighth-grade girl with the background of an average single-sex school student, chosen randomly from the population, would improve her achievement by about 40 percent in a single-sex context, whereas a boy would *reduce* his score by 20 percent. Jimenez then explored possible reasons for the performance difference. Finding no structural or administrative advantages to single-sex schools (the opposite, in fact), he ran a regression for average pre-test score, proportion of mothers with greater than primary education, and proportion of fathers with professional occupations. Jimenez found a high correlation between an average student's pre-test and post-test scores for both boys and girls in both single-sex and coed schools. The study concluded that "peer quality" effects seem to account for most of the difference between the two types of schools.[47]

In some respects **Carpenter and Hayden's (1987)** study of single-sex schools in Queensland and Victoria, Australia, confirms the importance of peer influence, social context, and socioeconomic status on positive outcomes for achievement. Questioning whether "type of secondary school attended affects girls' academic achievements net of other relevant factors," the authors compared the effects of school type with 12th-year students in Queensland (N=460) and Victoria (N=379). In Queensland all public secondary schools are coeducational, and all single-sex schools are private. Victoria, in contrast, contains many single-sex, public secondary schools. Carpenter and Hayden used multiple regression analysis to identify predictors of 12th-year success, and found that in both provinces, the mother's educational level affected achievement. In Victoria, however, school sex composition emerged as a factor that exposed girls to encouragement to attend college and mediated the effects of social structure. In Queensland, with a narrower range of schooling options, school sex composition was found to have no bearing on academic achievement. Carpenter's study implies that social context—including socioeconomic status and the variety of schooling available—may heighten or minimize the effects of school type.[48]

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Riordan's extensive work on single-sex education in the United States [see "The Future of Single-Sex Schools" on page 53 of this volume] similarly has found that school type benefits certain populations more than others. Riordan's 1985 study examined the various types of Catholic private schools used in comparisons with public schools, and concluded that only mixed-sex Catholic schools could be validly compared to coeducational public schools. Using a sample of white public and Catholic school students[29] from the full National Longitudinal Study of the High School Class of 1972, Riordan tested for differences between Catholic single-sex and public mixed-sex schools on several academic outcomes measures, including test scores in reading and math, 1972 verbal and math SAT scores, and a 1979 measure of educational attainment. Riordan found that Catholic single-sex schools scored consistently higher than coed public schools; attainments in Catholic mixed-sex schools differed little from those in public coed schools. Of all the populations tested, however, "females in Catholic single-sex schools [were] clearly the most favored group in any comparison with public school students." Riordan attributes some of the advantage to school context, and presents data to support the idea that Catholic single-sex schools heighten the academic atmosphere (requiring students, for example, to spend more time on homework), although he does not definitively attribute the differences in attainment to school context.[30]

A subsequent study in 1994 used the "High School and Beyond" longitudinal data to clarify further the effects of single-sex education on different populations and in specific curricular areas. Riordan conducted separate analyses for students by sex and race on academic and attitudinal outcomes. He discovered that among African American and Hispanic American students attending Catholic secondary schools, both males and females in single-sex schools scored higher on standardized cognitive tests than their same-sex peers in mixed-sex schools. To explain the one-year grade equivalent of difference in cognitive learning, Riordan applied a set of formal and informal school variables as controls. They included type of curriculum, amount of homework, discipline, parental interest, and number of successful role models. Policies in single-sex schools emphasize the academic side of these variables, he argues, which explain virtually all of the test score differences between the two types of schools. Both males and females in single-sex schools also gained on attitudinal variables such as leadership behavior and a "sense of environmental control," but much less of this difference was explained by school variables.[31]

Some of Lee's substantial research on single-sex education [see "Is Single-Sex Secondary Schooling a Solution to the Problem of Gender Inequity?" on page 41 of this volume], like Riordan's, has used the longitudinal "High School and Beyond" data to gauge achievement and attitude effects—and sustained effects over time—of single-sex education. **Lee and Bryk (1986)** examined a random sample of 1,807 students in 75 Catholic high schools, drawn from the "High School and

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Beyond" survey, which included data for students' sophomore and senior years. The study controlled for several background variables, including socioeconomic status, race/ethnicity, and plans to attend college. Data were analyzed for numerous academic and attitudinal variables. The hypothesis that students in single-sex schools would "significantly outperform their counterparts in coeducational schools on a wide array of outcomes" was confirmed by the analysis. Girls' schools, Lee and Bryk found, evidenced "consistent and positive effects" on students' attitudes toward academics (a point borne out in other research on attitudes, discussed above), course enrollment patterns, achievement, and educational aspirations. While conceding the possibility of a "selection bias"—that parents choose single-sex schools for specific reasons that affect outcomes—Lee speculates that policies or conditions within single-sex schools—ranging from school resources, curriculum homogeneity, gender composition of the faculty or administration, to school teaching environment—may contribute to effects on achievement and attitudes.[32]

Marsh (1989) disputes Lee and Bryk's (1986) findings on methodological grounds, generating different conclusions from the same data. He criticizes Lee's use of a "one-tailed" significance test, which allows the discovery of "significant differences" only in the direction of single-sex education (Hence, Marsh argues, Lee cannot find any positive effects in favor of coeducation.) He also faults Lee and Bryk's placement of significance at $p < 0.05$, rather than the stricter standard of $p < 0.01$. Marsh concludes that 9 of the 74 tests Lee found statistically significant (1986) would have been nonsignificant had a two-tailed test been used. Furthermore, at the $p < 0.01$ level, he contends, only 3 of the 74 tests were statistically significant. Marsh also argues that the controls for pre-existing differences in Lee's study failed to account for possible pre-existing differences in academic achievement. Marsh conducted four separate analyses to determine which differences in 1982 and 1984 outcomes "may (possibly) be interpretable" as school type effects. Although large differences by school type were ascertained before any controls were applied, the differences diminished in number as Marsh sequentially applied controls in the next stages. When he controlled for pre-enrollment differences in student achievement as represented in 1980 academic outcomes—the "most demanding test" of school type differences—he found only three significant effects by school type, on relatively unimportant variables.[33]

Lee has defended her methodological premises, and in **1990 Lee and Marks** revisited the "High School and Beyond" survey to investigate the "sustained effects" of single-sex schools on attitudes, behaviors, and values. The 1990 study first discovered that those women who had attended single-sex schools had higher educational aspirations and were more likely than their coed counterparts to attend selective four-year colleges. However, after controls were applied for attendance at a selective college, the effects on young women's aspirations disappeared. This led Lee and Marks to

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conclude that single-sex education may be an indirect influence, in that it facilitated "entry into a select college in the first place," rather than a direct influence. The study found that single-sex girls continued to hold less stereotypic views of gender roles into the college experience, and that this constituted one of the sustained effects of single-sex secondary education. "Something of value appears to be going on" in single-sex secondary schools, Lee and Marks conclude.[34]

Lee has also researched single-sex education outside the United States, using data from the Second International Mathematics Study (SIMS) to investigate the effects of school type on Nigerian girls' math achievement. Nigeria, like Australia and New Zealand, presents unique opportunities to study school type effects because its public schools include single-sex schools.

Lee and Lockheed's 1990 study of 1,012 students in ninth-grade Nigerian public schools measured mathematics achievement and stereotypic views of mathematics. Analyzing data drawn from the Second International Association for the Evaluation of Educational Achievement, Lee and Lockheed found no significant "gender gap" between mathematics scores of Nigerian boys and girls, "once the other variables in the model are taken into account." But girls in single-sex schools outperformed other girls in mathematics, the study found, while boys in single-sex schools did the reverse, after the study adjusted for substantial differences in student background, school resources, and teacher attitudes. As in other studies, girls in single-sex schools had a less stereotypical view of math, while boys in single-sex schools had magnified stereotypes of the subject.[35]

Assessing some of her work on single-sex education in a recent review of "Gender Equity and the Organization of Schools" (1997), Lee mused on why advantages for girls found in single-sex Catholic schools did not translate to other independent single-sex schools. She tried to identify unique characteristics of Catholic single-sex schools that might account for their measured benefits, characteristics "simultaneously related to the effectiveness and equity parameters" that constitute "good" schools as Lee defines them. These characteristics include smaller school size, a constrained curriculum that is mostly academic, homogeneity in course selection, high order pedagogy, and teachers' belief in their students' ability to learn. "Single-sex schools for girls," she concludes, "often look this way."[36]

Lee cautions, in this spirit, that the extensive research on single-sex education "should not be interpreted as favoring gender separation in educational settings," an approach she sees as "misguided." Rather, the characteristics of schools that show advantages for girls might be incorporated into coeducational schools as they are restructured in the context of educational

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reform. "High schools should be smaller," she recommends, and "function as communities." These properties are commensurate with a certain type of single-sex school—Catholic and private—that has proven advantageous for girls."

Summary

Studies that have discovered positive achievement effects attributable to school type share some characteristics. Several studies view their findings—and positive outcomes—as specific to certain contexts. Lee, for example, does not find the same positive outcomes for independent schools generally as she does for Catholic single-sex schools; Carpenter and Hayden document positive outcomes for single-sex schools in one context—Victoria, rich in single-sex public schools—and not in another—Queensland, with no single-sex public schools; Jimenez similarly underscores that research on single-sex education must be "sector specific," that is, it must adequately control for differences between and among private and public schools.

Second, many of these studies emphasize peer influence and peer group characteristics—including socioeconomic status—as strong factors that may affect performance and relate indirectly to school type. Jimenez and Lockheed conclude that "peer groups account for the bulk of the difference in achievement effects between coeducational and single-sex schools," particularly for girls, and Carpenter and Hayden similarly find that friends' college plans and academic achievement are positively correlated in single-sex schools. Lee and Bryk (1986) also note that association with academically oriented friends is more likely in single-sex schools. Incidentally, studies of single-sex schools that found no corrected positive effects also corroborate the importance of peer socioeconomic status and influence in determining outcomes. Such studies include those by Young, who found that the "average socioeconomic status" of peers most dramatically influenced student science performance; Bell, who attributed raw differences in performance to the "fact that a greater proportion of the single-sex schools . . . [have] pupil selection policies;" and Workman, who noted the positive influence of "bright" students on group learning outcomes.

Notwithstanding the socioeconomic contexts that may augment a single-sex environment's positive outcomes for girls, these studies also tend to recognize that the schools are "doing something different" or, in Lee's terms, that something of value is happening in them for girls, perhaps extrinsic to sex composition itself, that may be reproducible in the coeducational context. Consequently, these studies view policy and training interventions as particularly valuable. Jimenez concludes that "there are important managerial incentives, teacher practices, and social

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interactions in female single-sex settings ... that result in enhanced achievement." Lee summons data from "effective" Catholic single-sex schools to profile how public, coeducational schools might be restructured and re-organized in ways conducive to higher achievement. Riordan speculates that Catholic schools "may be able to provide greater control and discipline," and a stronger academic program, which might inform coeducational practice.

Other studies have not claimed positive achievement effects for single-sex programs. Of particular interest is the paradox regarding single-sex classes. Although research finds that girls tend to view the single-sex classroom as more conducive to learning, and express greater confidence in this environment, research has also demonstrated consistently that girls' math and science achievement, measured by a variety of means, has not shown statistically significant gains in the single-sex classroom. Those studies that investigate girls' achievement in single-sex schools and conclude that school type does not affect outcomes typically ascribe the raw differences in scores to factors such as the selectivity of the school or the socioeconomic advantages of those parents opting for single-sex education.

Studies that concentrate on attitudinal variables have yielded some consistent findings. On self-esteem, an outcome of arguable value in educational research, studies that examine differences in specific domains of self-concept note that girls in single-sex schools may draw greater confidence from academic competence, whereas girls in mixed-sex contexts may draw more esteem from physical appearance. Studies have not documented overall differences in the level of self-esteem. Research on girls' subject preferences have documented almost uniformly that single-sex contexts foster less stereotypical views of subjects such as math, and may foster stronger preferences for these traditionally "male" fields. However, studies that investigated "sex stereotyping" more generally have not found that the single-sex environment minimizes this practice to any significant degree. Finally, studies concur that students perceive the single-sex school environment to be more "orderly" and "controlled," but diverge somewhat in their assessments of which environment is "preferred" by students.

Although research findings often may be referenced as in support or opposition to single-sex education, the overview of literature presented here suggests that specific practices and characteristics of single-sex environments may contribute to their purported success, and that at least some of these practices may be translatable to coeducational environments. Furthermore, the research—while inconsistent in its overall assessments of whether or not single-sex is "better" than coeducation for girls—does reveal some areas of consensus on specific indicators, which may serve as starting points for further research into how and why single-sex schools affect educational outcomes.

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Endnotes

1. U.S. Department of Education, Office of Educational Research and Improvement, "Single-Sex Schooling: Perspectives from Practices and Research," unpublished paper, December 1992:71.
2. Much of the interest in single-sex education in the last two years has been stimulated by the establishment of all-male African American schools and pull-out programs or, as in the Baltimore example, coeducational Afrocentric academies that have single-sex classes. Because this is a recent phenomenon, research on the single-sex aspects of these schools is limited.
3. Carol Ascher, "School Programs for African American Males ... and Females," *Phi Delta Kappan* 73, no. 10 (June 1992): 779; Peter Carpenter and Martin Hayden, "Girls' Academic Achievement: Single-Sex Versus Co-educational Secondary Schools in Australia," *Sociology of Education* 60 (1987): 156; L. Yates, *The Education of Girls: Policy, Research and the Question of Gender* (Melbourne: Australia Council for Educational Research, 1993): 96.
4. James Macfarlane and Pat Crawford, "The Effect of Sex-Segregated Mathematics Classes on Student Attitudes, Achievement, and Enrollment in Mathematics," evaluation for the North York Board of Education, Willowdale, Ontario, September 1985: 2; Illinois Mathematics and Science Academy, "Calculus-Based Physics Exploratory Study," December 1994: 12.
5. Single-sex classes have of late been inspired by a desire to narrow the gap between girls' and boys' math achievement, and in other cases by social concerns.
6. Cornelius Riordan, cited in Scott Baldouf, "Merits, Demerits of Single-Sex Education Raised in Harlem," *Christian Science Monitor*, September 4, 1996.
7. Valerie E. Lee and Marlaine M. Lockheed, "The Effects of Single-Sex Schooling on Achievement and Attitudes in Nigeria, *Comparative Educational Review* 34, no. 2 (1990): 228.
8. Valerie E. Lee and Helen M. Marks, "Who Goes Where? Choice of Single-Sex and Co-educational Independent Secondary Schools," *Sociology of Education* 65 (1992): 229; U.S. Department of Education, Office of Research and Improvement, Gilbert Edes, "Girls' Schools: Laboratories in Progress," in "Single-Sex Schooling: Proponents Speak," December 1992: 5; Emmanuel Jimenez and Marlaine Lockheed, "Enhancing Girls' Learning Through Single-Sex Education: Evidence and a Policy Conundrum," *Educational Evaluation and Policy Analysis* 11, no. 2 (1989): 118.
9. This review is based on more than 100 articles and essays from national and international contexts. It includes some unpublished work presented at conferences or available through ERIC in the case of single-sex classes, especially, but confines itself to a review of research conducted after 1980.
10. Partly for expediency, this review concentrates on research on the effects of single-sex programs on girls. Sorting through the findings as they apply to even one group of students—boys or girls—is a substantial project. Additionally, concern about girls' academic performance and opportunities has inspired many of the studies on single-sex education in the first place. However, by no means are findings concerning girls' outcomes equally applicable to boys. Several studies have documented that boys may thrive in coeducational environments, for reasons that require more research, whereas girls may accrue some benefits in single-sex environments. The impossibility of providing theoretically optimal learning environments for both sexes by conducting coed programs for boys at the same time as single-sex programs for girls underscores the importance of extracting from the available research insights into how to improve the coeducational environment itself for all students.
11. Judith Gill, "Different Contexts, Similar Outcomes," paper presented at the American Educational Research Association annual meeting (New York, 1996): 7; Gaell Hildebrand, "Together or Apart? Organization, Policy and Practice in Co-educational and Single-Sex Education," paper presented at the American Educational Research Association annual meeting (New York, 1996): 3; Judith Gill, "Rephrasing the Question: Is Single-Sex Schooling a Solution to the Equity Equation?" *Curriculum Perspectives* 12, no. 4 (1992): 2.

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12. Ed Cairns, "The Relationship Between Adolescent Perceived Self-Competence and Attendance at Single-Sex Secondary School," *British Journal of Educational Psychology* 60 (1990): 210.
13. Jacqueline Granleese and Stephen Joseph, "Self-perception Profile of Adolescent Girls at a Single-Sex and a Mixed-Sex School," *The Journal of Genetic Psychology* 60 (1993): 210.
14. Anne Foon, "The Relationship Between School Type and Adolescent Self-Esteem, Attribution Styles, and Affiliation Needs: Implications for Educational Outcome," *British Journal of Educational Psychology* 58 (1988): 44-54.
15. Many "inferential" statistical studies, which attempt to generalize about populations with some known probability of error from the database or study, utilize regression analysis to determine the relationship between variables hypothesized to be relevant to the outcome of interest—for example, girls' achievement in math. A "multivariate regression analysis" uses two or more independent variables (in this case, for example, the sex composition of the teaching staff, or the sex composition of the student body) to predict a dependent variable (in this case, affective outcomes such as a student's "sense of mastery" or self-esteem).
16. H. Brutsaert and P. Bracke, "Gender Context in Elementary School," *Educational Studies* 20, no. 1 (1994): 3, 10.
17. Ian Smith, "The Impact of Schooling on Student Self-Concepts and Achievement," paper presented at the Biennial Meeting of the International Society for the Study of Behavioral Development (August 1996).
18. Foon, "School Type and Adolescent Self-Esteem": 52; Edward Vockell and Susan Lobonc, "Sex Role Stereotyping by High School Females in Science," *Journal of Research in Science Teaching* 18, no. 3 (1981): 213; Andrew Stables, "Differences between Pupils From Mixed and Single-Sex Secondary Schools in their Enjoyment of School Subjects and their Attitudes to Science and to School," Educational Review 42, no. 3 (1990): 227.
19. Winifred Mallam, "Impact of School-Type and Sex of the Teacher on Female Students' Attitudes Toward Mathematics in Nigerian Secondary Schools," *Educational Studies in Mathematics* 24 (1993): 227; Ann Colley, "School Subject Preferences of Pupils in Single-Sex and Co-educational Secondary Schools," *Educational Studies* 20, no. 3 (1994): 381.
20. The "Attitudes Toward Women Scale for Adolescents" and its adaptation for children is used to assess attitudes about gender roles and in its standard form has 12 items with four responses, according to Signorella.
21. Mary Harris, "Co-education and Sex Roles," *Australian Journal of Education* 30, no. 2 (1986): 127; Margaret Signorella and Irene Frieze, "Single-Sex versus Mixed-Sex Classes and Gender Schemata in Children and Adolescents: A Longitudinal Comparison," *Psychology of Women Quarterly* 20 (1996): 606.
22. Valerie E. Lee and Helen M. Marks, "Sexism in Single-Sex and Co-educational Independent Secondary School Classrooms," *Sociology of Education* 67 (1994): 93, 104, 114.
23. Lee and Marks, "Sexism in Single-Sex": 115; Gill, "Different Contexts": 17.
24. In feminist theory, "sex" typically designates the biological status of being "male" or "female," whereas "gender" designates the characteristics that have been associated with being male or female—that is, masculine traits such as aggression or "feminine" traits such as nurturance. "Gender" would include, as well, physical appearances associated with maleness and femaleness. In this light, some of the research on single-sex education has confused sex and gender, as in references to "*single-gender*" schools. Schools with all girls are not necessarily single "gender" because they may include students with both "masculine" and "feminine" identities. The example of the "sissy" in an all-boys school captures the possibility that one might have both masculine and feminine "*gender*" roles in a single-sex context.
25. R.R. Dale, *Mixed or Single-Sex School?* (London: Routledge Kegan and Paul, 1969); J.S. Coleman, *The Adolescent Society* (New York: Free Press, 1961): 51,231.
26. The "High School Characteristics" Index consists of 30 10-item scales in true-false format. Schneider and Coutts (1982): 900.
27. Edison Trickett et al., "The Independent School Experience: Aspects of the Normative Environments of Single-Sex and Coed Secondary Schools," *Journal of Educational Psychology* 74, no. 3 (1982): 374; Frank W. Schneider and Larry M. Coutts, "The High School Environment: A Comparison of Coeducational and Single-Sex Schools," *Journal of Educational*

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Psychology 74, no. 6 (1982): 899, 904; Frank Schneider, "In Favour of Coeducation: The Educational Attitudes of Students from Coeducational and Single-Sex High Schools," *Canadian Journal of Education* 13, no. 4 (1988): 490.

28. Mark Gierl, "A Student's Perspective on the Intrinsic Characteristics of the Single-Sex Physics Class," paper delivered at the American Educational Research Association annual meeting (New Orleans, 1994): 15.

29. Macfarlane and Crawford, "The Effect of Sex Segregated Mathematics Classes": 11, 19, 28.

30. T.J. Harvey, "Science in Single-Sex and Mixed Teaching Groups," *Educational Research* 27, no. 3 (1985): 179-182.

31. Kenneth J. Rowe, "Single Sex and Mixed Sex Classes: The Effects of Class Type on Student Achievement, Confidence and Participation in Mathematics," *Australian Journal of Education* 32, no. 2 (1988): 183, 195.

32. Gilah Leder and Helen Forgasz, "Single-Sex Mathematics Classes in a Co-educational Setting: A Case Study," paper presented at the American Educational Research Association annual meeting (New Orleans, 1994): 20, 23.

33. Noreen Webb, "Sex Difference in Interaction and Achievement in Cooperative Small Groups," *Journal of Educational Psychology* 76, no. 1 (1984): 39.

34. Mary Burke Workman, "The Effects of Grouping Patterns in a Cooperative Learning Environment on Student Academic Achievement," thesis, Dominican College (May 1990): 36.

35. Lesley Parker and Leonie Rennie, "A Comparison of Mixed-Sex and Single-Sex Grouping in Year 5 Science Lessons," paper presented at the American Education Research Association annual meeting (San Francisco, 1986): 1; Lesley Parker and Leonie Rennie, "Single-Sex Grouping: Issues for School Administrators," paper presented at the Americanal Educational Research Association (New York, 1996): 13, 10.

36. Gaell Hildebrand, "Together or Apart?: Organization, Policy and Practice in Co-educational and Single-Sex Education," Paper presented at the 1996 American Educational Research Association annual meeting in New York, 17.

37. A "descriptive" study, as opposed to an inferential statistical study, is one that analyzes data but does not posit or test a hypothesis to predict future outcomes based on the data gathered.

38. Jeremy Finn, "Sex Differences in Educational Outcomes: A Cross National Study," *Sex Roles* 6, no. 1 (1980): 23.

39. Jane Steedman, "Examination Results in Mixed and Single-Sex Schools," in *Studying School Effectiveness*, ed. David Reynolds (London: Falmer, 1985).

40. John Bell, "A Comparison of Science Performance and Uptake by Fifteen-Year-Old Boys and Girls in Co-educational and Single-Sex Schools—APU Survey Findings," *Educational Studies* 15, no. 2 (1989): 201.

41. Deidra Young and Barry Fraser, "Sex Differences in Science Achievement," unpublished paper (1992): 7.

42. Richard Harker and Roy Nash, "School Type and the Education of Girls: Co-ed or Girls Only?" paper delivered at the American Educational Research Association annual meeting (Chicago, 1997): 17, 18.

43. "High School and Beyond" is a longitudinal study of secondary education conducted by the National Center for Educational Statistics in 1980. According to Lee, the original sample, from which Lee and others draw smaller samples, consisted of 1,015 schools and approximately 36 sophomores and 36 seniors within each school, for a total sample of more than 73,000 students. Private schools were deliberately oversampled.

44. Paul C. LePore and John Robert Warren, "A Comparison of Single-Sex and Coeducational Catholic Secondary Schooling: Evidence from the National Educational Longitudinal Study of 1988," *American Educational Research Journal* 34, Fall 1997, no. 3, 492, 505-06.

45. Marlene Hamilton, "Performance Levels in Science and Other Subjects for Jamaican Adolescents Attending Single-Sex and Co-educational High Schools," *Science Education* 69, no. 4 (1985): 525-547.

46. Heckmans two-step methodology, as Jimenez describes, allows for the researcher to correct for sample selection bias by estimating what determines choice of school and then correcting for the selection bias on the basis of results achieved through the first step.

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47 Jimenez and Lockheed, "Enhancing Girls' Learning": 125, 135

48 Carpenter and Hayden, "Girls' Academic Achievement": 157

49 Riordan excluded minorities from this study in order to better mitigate the effects of socio-economic status on the findings.

50 Cornelius Riordan, "Public and Catholic Schooling: The Effects of Gender Context Policy," *American Journal of Education* 5 (1985): 533.

51 Cornelius Riordan, "Single Gender Schools: Outcomes for African and Hispanic Americans," in *Sociology of Education and Socialization* 18 (1990): 177-205. I have drawn some of this summary from Riordan's description of his research in *Equality and Achievement: An Introduction to the Sociology of Education* (New York: Longman, 1997): 138-39.

52 Valerie E. Lee and Anthony Bryk, "Effects of Single-Sex Secondary Schools on Student Achievement and Attitudes," *Journal of Educational Psychology* 78, no. 5 (1986): 387.

53 Herbert Marsh, "Effects of Attending Single-Sex and Co-educational High Schools on Achievement, Attitudes, Behaviors, and Sex Differences," *Journal of Educational Psychology* 81, no. 1 (1989): 78, 80.

54 Valerie E. Lee and Helen M. Marks, "Sustained Effects of the Single-Sex Secondary School Experience on Attitudes, Behaviors and Values in College," *Journal of Educational Psychology* 82, no. 3 (1990): 588.

55 Valerie E. Lee and Marlaine Lockheed, "The Effects of Single-Sex Schooling on Achievement and Attitudes in Nigeria," *Comparative Education Review* 34, no. 2 (1990): 225.

56 Valerie E. Lee, "Gender Equity and the Organization of Schools," in *Gender, Equity and Schooling: Policy and Practice* (New York: Garland Publishing, 1997): 152.

57 *Ibid.*, 152, 154, 156.

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Roundtable Papers

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Is Single-Sex Secondary Schooling a Solution to the Problem of Gender Inequity?

Valerie E. Lee

What is the issue? Are children advantaged or disadvantaged by attending single-sex schools, compared to their counterparts who experience coeducational schooling? This question, stated this way, falls within a classic comparative evaluation framework: "Which works best?" The issue is whether single-sex secondary schooling works better than coeducation for the adolescents who experience it. And what do we mean by "better"?

I have conducted several studies evaluating the relative efficacy of single-sex and coeducational schooling. The topic is consistent with the broader research agenda that motivates me: a concern for unequal educational outcomes by social background (in this case, gender). For several years, I have been trying to draw larger meaning from my own research on single-sex secondary schooling. The reason this has been so difficult is that the findings from my several studies on the topic are not consistent. I use the opportunity of the AAUW's attention to this topic to describe my personal dilemma and how I have tried to draw meaning from it.[1]

Limiting the Scope

My own research on the topic is limited in several ways. First, I studied the option of single-sex *schools* rather than single-sex *classes* in coeducational schools. Second, I have studied this educational option mostly in the United States, even though it is actually more common outside of the United States.[2] Third, my research has targeted secondary schools. Fourth, as single-sex education in the United States is illegal in the public sector (although this is now being challenged), I have studied the option in private schools, in particular Catholic and independent schools.[3] The fifth limitation concerns the set of outcomes I have chosen to pursue—the outcomes addressing the "better in what ways?" issue. I have focused on a relatively narrow range of educational outcomes, such as achievement, aspirations, and academic behaviors. Though one may evaluate the efficacy

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of single-sex schooling on students' psychological attitudes (for example, self-concept, self-esteem, or locus of control), my studies have not investigated such outcomes.

There are some theoretical reasons why single-sex schooling might work differently by gender. From the recent flurry of research describing girls' disadvantaged status in U.S. schools, we might conclude that single-sex education is mainly an issue for females (that is, gender equity might be achieved by removing boys).[4] Thus, I add a sixth restriction. My evaluation designs investigate the question of relative efficacy separately by gender: "Which works best for whom?" Girls in single-sex schools are compared to counterpart girls attending coeducational schools; likewise, I compare boys in the two types of schools. Most of my studies have used large and scientifically drawn samples, we analyzed our data with quantitative (statistical) methods, and the studies followed well-established evaluation designs. Thus, their results should be generalizable to nationally representative populations. Most of the studies survived the peer review process and have been published in scholarly journals.

Although thus far I have discussed restrictions to research on this topic, let me suggest that most research that focuses on gender inequity may actually be a bit too restricted. For example, research comparing boys' and girls' achievement and course-taking in high school most often centers on math and science, rather than including the broader scope of subjects that constitute the secondary school curriculum. Reading, writing, social studies, and foreign language are seldom discussed in this research venue, although gender differences exist in these areas (many favoring girls). Why should we examine only curriculum areas where girls are disadvantaged? I have argued elsewhere for broadening the range of consideration of gender equity to *all* areas of the curriculum where there are gender differences.[5]

Where Is the Contradiction?

The file drawer problem

Researchers and statisticians alike recognize that published studies represent a biased sample of research on any topic. This is because journals typically reject papers without statistically significant findings, creating what is sometimes called *the file drawer problem*.[6] According to Rosenthal and Rosnow, "[T]he journals are filled with the 5 percent of studies that show Type I errors [in which differences are statistically significant at probabilities below .05], while the file drawers back at the lab are filled with the 95 percent of the studies that show nonsignificant ($p > .05$) results."[7] In this case, studies documenting statistically significant differences in outcomes between students in single-sex and coeducational schools would be published, whereas studies

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that did not find such differences would not." Thus, a review of the literature on this topic favors studies showing differences. Studies with no-difference findings aren't there to be reviewed.

Two strands of research

Let me return to my own studies, which fall into two strands: those in Catholic schools and those in independent schools. Studies in the first strand used data collected in the early 1980s in a nationally representative sample of Catholic high schools that were part of the U.S. Department of Education's *High School and Beyond (HS&B)* study.[9] These studies documented findings favoring single-sex schooling for girls, but generally found few differences between single-sex and coeducational schooling for boys. These studies, particularly the one published in 1986 that was co-authored with Anthony Bryk, have been widely cited. Because the Catholic school study results seemed relatively conclusive, at least in terms of the efficacy of single-sex schools for young women, I pursued this research topic in the other major group of U.S. schools where it is available: independent schools. Because there were so few schools of this type in the *HS&B* school sample, I collected my own data in 60 independent secondary schools (20 girls' schools, 20 boys' schools, and 20 coed schools). Several "second strand" studies have also been published.[10]

Inconsistent findings

The fact that many studies from both research strands appeared in journals may be deceptive. Readers who look closely at those studies (including the titles) will notice a difference. The Catholic school studies focused on the *effects* of single-sex and coeducational schooling for those students who attended the two types of schools—the classic evaluation design I described above. However, the independent school studies do not focus on effects. Why? *We found no consistent pattern of effects for attending either single-sex or coeducational independent schools for either boys or girls in independent schools.* Of course, my colleague Helen Marks and I investigated these questions on a broad array of outcomes. We had designed our data collection to enable the same types of comparisons that typified the Catholic school studies. However, we could not publish a study with no clear pattern of findings. Those results still rest in my "file drawer."

Let me summarize. In a series of evaluation studies that compare the relative efficacy of single-sex and coeducational secondary schooling on adolescent boys and girls, we found that single-sex schooling seemed to make a difference *only in Catholic schools*. The findings there were consistent: positive effects for girls but no difference for boys. However, in another set of studies structured to enable similar comparisons in independent schools, there was no pattern of findings favoring either single-sex or coeducational schools, either for boys or for girls, on a broad range of outcomes. It isn't that there were no findings; rather, on some outcomes single-sex schooling was

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favored, on some outcomes coeducational schooling was favored, and on many outcomes there were no differences. The results were inconsistent within types of outcomes, across genders, and across school sectors. Let me add that all these studies had sufficiently large sample sizes that rather small differences would emerge as statistically significant (that is, we had adequate statistical power). However, even when there were significant differences, the effects were quite small.[11]

Differences Between Catholic and Independent Schools

I have devoted much time and effort and many resources to these studies. The topic of single-sex schooling has garnered more and more public attention in the last decade, as public interest in gender equity and private schools has grown. This has led to frequent inquiries about my studies on the topic by other researchers, by the media, and now by the AAUW Educational Foundation. But what can I say? What have I learned? For five years, I had an unfulfilled contract to write a book on this topic. I would write this book if I knew what to say.

I have pondered these inconsistencies. It seemed that these findings could have been the result of several differences between the studies. One difference is *substantive*. Could there be something about Catholic girls' schools that allows them to provide advantages to their students that independent girls' schools do not? Why did independent boys' schools show some favorable (and some unfavorable) outcomes when Catholic boys' schools were no different from coed schools in their effects on male students? A second difference is *temporal*. The Catholic school data were collected in 1980 and 1982, whereas the independent school data were collected in 1989 and 1990. A third difference is *analytic*. The Catholic school studies were favored by the availability of longitudinal data on the same studies, whereas the independent schools focused on data drawn only from students as twelfth-graders. But we were able to draw test scores at high-school entry from student records, which allowed for a sort of pre/post analysis design.

Social location

Another important difference between Catholic and independent single-sex schools has to do with *relative selectivity*, what sociologists would call the schools' "social locations." It is clear that while Catholic high schools traditionally served a largely middle- or working-class (and overwhelmingly Catholic) clientele, increasingly these schools have come to serve more minority, economically disadvantaged, and non-Catholic students and families. Our research on Catholic schools, which includes comparisons with public schools, documents the particular effectiveness of these schools for disadvantaged students.[12] The tuitions, although not trivial for families of modest means, are considerably lower than those of independent schools. Most independent

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schools serve upper- or upper-middle-class clienteles. Not only do these schools' high tuitions make them selective in economic terms, but many independent schools are academically selective as well. These institutions educate the children of the elite, whereas most Catholic schools do not. Catholic schools thus offer social mobility to their students, while independent schools aim more to maintain privilege. These differences suggest that students and families might be looking to Catholic schools for their opportunity structures, and this could be especially true for girls. Our evidence suggests that students and families select independent schools (particularly single-sex schools) more for their traditional structure and for status preservation.

The difference in social location between the clienteles of Catholic and independent schools could explain the differing roles for teachers. Our studies in both sectors found that the gender of the teaching staffs were well matched to the schools' gender composition. Although women teaching in Catholic schools may serve as professional role models for their students, independent school students rarely view any teacher—male or female—as a credible role model. In our interviews in those schools, students told us that they respected their teachers' authority in their subjects. However, several students disdained teaching as a profession (they also indicated that their parents would oppose such a career choice). These students (male and female) were aiming toward high-prestige and high-income professions. Unless their own mothers had lucrative and prestigious jobs (which was unusual), students in independent schools showed little respect for their mothers' work. We heard more than a few references to the "little jobs" their mothers held.

History

The schools' histories provide another reasonable explanation for sector differences in single-sex school effects. In both sectors, virtually all secondary schools began as single-sex institutions. As coeducational schools began to open in the Catholic sector, they were established as inner-city schools with fewer resources that were more often governed by parishes and dioceses than by religious orders. Even today, most single-sex Catholic schools are owned, operated, or sponsored by religious orders. Religious-order schools are the relatively more elite institutions in the Catholic sector (for example, Jesuit or Sacred Heart schools). A higher proportion of independent schools began as coed schools (particularly the more progressive ones). In the wave of conversion to coeducation that swept both sectors in the 1970s and 1980s, it was mostly the elite boys schools—Exeter, Groton, St. Mark's, Choate, Andover, and St. Paul, for example—that opened their doors to girls. With a few exceptions, the most elite independent schools are now coeducational, mostly boys' schools that began to accept girls or that actually subsumed a girls' school. On the other hand, today's most elite Catholic secondary schools are still single-sex.

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Separation is not a solution

Although these potential explanations for differences in findings about the efficacy of single-sex schooling in the Catholic and independent sector provide some intellectual satisfaction, I found none of the explanations compelling in explaining the inconsistent pattern of findings. The conclusions I offer here admittedly include a good deal of speculation. They are considerably more speculative than the types of conclusions I typically offer in published empirical work.

In my opinion, separating adolescents by gender for secondary schooling is not an appropriate solution to the problem of gender inequity in educational outcomes, either in the short or the long run. Though separate-by-gender education surely benefits particular students (probably girls more than boys), or may be more beneficial in some settings (perhaps in Catholic schools), educators and policymakers should not turn to single-sex schooling as a way to make educational outcomes equitable by gender.

Let me emphasize that these conclusions are personal and speculative. However, I arrive at them based on more than a decade of research on this topic, derived from a series of studies in two different types of single-sex and coeducational private schools, and they rest on my understanding of the research base on single-sex schooling. They also take into account my other research on equity and school organization. Here I take advantage of the fact that this particular forum is perhaps less stringent in terms of the need for strict evidence for every statement than the academic journal forum that I turn to more frequently.

Gender and school climate

My research team and I conducted a study of gender and school climate under the sponsorship of the AAUW Educational Foundation.[13] The study was structured to examine how gender differences in educational outcomes for eighth-graders vary as a function of the organizational features of the middle-grade schools they attend. The paper used a statistical method, hierarchical linear modeling (HLM), that reflected the nature of the research question driving the study. This study structure, called "school effects research," characterizes much of my recent work. We defined school climate along three dimensions: (1) composition and structure climate (average social class, minority concentration, school size, and sector); (2) teaching and learning climate (tracking, authentic instruction, teacher/student relations); and (3) normative climate (order and safety, academic press, parental involvement). Overall, we found that elements of school climate defined this way were more strongly related to average engagement and achievement differences

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between schools than to the gender gap in these outcomes inside each school. It should be noted that gender differences in educational outcomes, although important to consider, are much smaller than those related to either race or social class. Not all favor boys.

Some of the findings of that study support an explanation for gender equity based (at least in part) on the organizational properties of schools. For example, we found more gender equity in smaller schools and in schools with a more academic orientation. Two findings were surprising. Social studies achievement was higher in schools with more positive relations among students and teachers; however, the gender gap in achievement in this subject was *increased* by this school climate feature. Similarly, we found that schools with more parental involvement had *larger* gender gaps in math achievement. Both of these gender gaps favored boys. We usually think of parental involvement and positive teacher/student relations as advantageous school characteristics, and in general these factors modestly increased achievement. Our findings, however, suggested that these school features differentially benefit boys. It is seldom recognized that generally positive organizational factors (such as parent involvement and teacher/student relations) could differentially (and not always positively) influence students. Because we had a large sample and a research design focused on organizational effects and on social equity, we were able to uncover some inequities for girls that resulted from generally positive features of school climate.

What are "good" schools?

Here I move away from my research on gender and describe in very general terms the results of some other research I have conducted that investigates school organization effects on student outcomes. Rather than the context of gender, the equity focus of these studies was on socioeconomic status (SES). Although these ideas grew out of my work on Catholic schools, more recently the focus has been on school restructuring. Thus, the findings generalize to U.S. secondary schools.[11]

Several characteristics of the organization of schools are associated with positive school outcomes. Broadly defined, these outcomes are of two types: (1) a high average within a school in terms of achievement, gains in achievement (or learning), or engagement with school (these are measures of effectiveness) and (2) a socially equitable distribution of these outcomes among students defined by their social background characteristics (equity). This dual outcome set is what my colleagues and I call "the social distribution of achievement." By this definition of equity, these educational outcomes should have a low relationship with race, ethnicity, gender, or SES. More specifically, a *good* school is one that simultaneously has a high average outcome (say achievement in mathematics) and a low relationship between math achievement and, say, SES. Or it could

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have high average achievement and a small gender gap (that is, the difference in achievement between boys and girls within the school).

In this series of studies, my colleagues and I have searched for properties of the organization of schools that are related simultaneously to both the effectiveness and equity parameters defined above.[15] We looked for school characteristics that typify good schools by this definition. Though not all of these characteristics were important in every study, a pattern of organizational features associated with good schools has emerged.

- Smaller school size;
- A constrained curriculum where almost all students take the same, mostly academic courses (a core curriculum approach);
- More personal social relations among school members. This defines these schools more as communities than bureaucracies;
- More authentic instruction, that involves students in higher-order thinking, teaching that is more constructivist than didactic, where students are encouraged and expected to become actively engaged in their own learning;
- A pattern of authentic instruction that is pervasive in the school rather than isolated in the classes of teachers who happen to teach this way; and
- A common willingness on the part of teachers to accept personal responsibility for all their students' learning, including a belief that all their students can learn what they are taught.

How is School Organization Related to Single-Sex Schools?

The bottom line here is simple: The organization of single-sex schools for girls is often characterized by these elements. For example, in both Catholic and independent schools, girls' schools are somewhat smaller. Although all high schools in the two sectors we studied are typically smaller than most public schools, girls' schools are relatively smaller even among schools in their own sectors. Although not all private schools would see smallness as an advantage (since tuition dollars are crucial to most schools' survival), our research has shown that many of the organizational properties on this list are easier to accomplish in smaller places.

Social organization

There is some research support, including in studies my colleagues and I have conducted, favoring high schools with women principals.[16] The findings are quite consistent. Compared to their male counterparts, women principals evidence a management style that is more democratic

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and participatory; their leadership is more personal, and they focus more of their efforts on the school's core technology than on management. Although very few U.S. high school principals are women (10 to 15 percent), girls' schools are quite likely to be headed by women. Girls' school faculties are composed mostly of women teachers. Not by accident (and probably related to principal and staff gender), girls' schools are more communally organized. Among administrators, teachers, and students, social interactions are more informal and more prevalent. The aims of the principals, focused on learning, are more likely to be the aims of the schools. We have some evidence that girls' schools are especially likely to espouse social justice as an explicit school aim.[17] This suggests that the equity dimension of my definition of good schools discussed above is more likely to accrue in girls' schools.

Social organization

We have no direct evidence that girls' schools are more academically oriented than other types of schools, but there is some indirect evidence. Our Catholic school studies showed that girls' school students had higher educational aspirations, were more likely to plan graduate school, and were headed to less stereotypically female fields.[18] The goal of almost all private schools, Catholic or independent, is academic; the schools' curricula reflect this orientation. Virtually all students take only academic courses (because those are the only courses offered). Thus, the differences in outcomes related to school academic organization that we have found among public schools are unlikely to occur in these private schools. We found, however, that Catholic girls' school students did more homework, associated with more academically oriented peers, took more math courses, and had higher achievement in reading and science than their female counterparts in Catholic coed schools.

Our studies in single-sex schools provided very little direct evidence about either the nature or quality of instruction. However, Catholic girls' school students described the quality of instruction in their schools as higher than did their coed counterparts. In field work, we observed more incidents of gender equity in independent girls' school classrooms (particularly by male teachers) than in either coed or boys' independent schools. There is, thus, some indirect evidence that girls' schools have some advantages in terms of authentic instruction.

Final Comments

Because my conclusions about gender and school organization are personal, in this paper I have relied mostly on evidence from the several studies I have conducted myself. These represent the source from which I drew my conclusions and speculations. I believe that proposed "solutions" to

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the problem of gender inequity in American schools that advocate separating the genders for schooling or for instruction are misguided. I do not think the research on single-sex schooling (my own and others') should be interpreted as favoring the separation of girls and boys for their education."

Although my research in the two sectors where single-sex schooling is available in the United States has convinced me that girls are seldom disadvantaged by being schooled in single-sex schools, my research in independent schools has suggested that this is not true for boys. Although I have not discussed single-sex classes in this paper, our research may have something to say about this. It is not possible to offer separate-by-gender classes only for girls without seriously influencing the gender balance in the remaining classes. We had indications from our research that when supposedly coeducational settings depart much from a 50-50 balance of girls and boys toward larger proportions of boys, there are some negative consequences for girls.[10] This would be a logical result of offering single-gender classes, or of offering single-sex schooling only for girls (which some have suggested).

This raises the question of how schools *should* respond to differential performance by girls and boys. Although separating instruction or schooling by gender is one response, I suggest that this probably represents an easy way out. The current effort to force the courts to declare legal an inner-city single-sex leadership academy for girls or single-sex classes for girls in math and science would seem to me to have mainly symbolic value. Programs like this make the public think, "We're really *doing* something to address the problems of inequity by gender!" But are they really? Doing *something* isn't the same thing as doing *the right thing*.

Much more difficult, but much more appropriate in my opinion, is for schools to make serious efforts to foster the organizational properties I spelled out above. Reform in these directions is surely not easy to accomplish, and such reforms may not carry the same symbolic value around which people can mobilize vocal public support (or opposition). However, we have accumulated a considerable body of evidence that schools typified by the organizational properties I have identified are better places for all students.

Most high schools should be smaller than they are. In them, social relations among faculty and students should be more personal and less formal, and these relationships should extend beyond the classroom. Most high schools should have a more academic orientation than they have. They should offer a curriculum that is comprised almost entirely of academic courses that all students take. Instruction in high schools should be more authentic and meaningful for all students, and it

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should involve the students in their own learning. All high school teachers should take responsibility for their students' learning—all their students (and not just their best students). High schools should function more as communities and less as bureaucracies.

This type of reform is not easy. Most U.S. high schools have a long way to go on any one of these dimensions. However, I suggest that short-term and seemingly easier reforms (such as single-sex public schools and single-sex classrooms) often deflect effort from the more difficult changes that require sustained effort by many people over long periods of time.

Notes

1. The general framework for the arguments made in this paper was first laid out elsewhere. See Valerie E. Lee, "Gender Equity and the Organization of Schools," in Barbara J. Banks and Peter M. Hall, eds., *Gender, Equity, and Schooling: Policy and Practice* (New York: Garland, 1997) 135-158).
2. In this discussion, I exclude a single-sex schooling study using data drawn from outside the United States. See Valerie E. Lee and Marlaine E. Lockheed, "The Effects of Single-Sex Schooling on Achievement and Attitudes in Nigeria," *Comparative Education Review* 34, no 2 (1990): 209-231.
3. These schools are called "independent" because they are members of the National Association of Independent Schools (NAIS). Their governance structure is very autonomous. Most (but not all) are elite private schools that charge high tuitions and have selective admissions criteria. Although some NAIS schools have a religious affiliation (Episcopal is most common), very few are Catholic schools. The clientele and aims of schools in the two school sectors—Catholic and NAIS—where single-sex secondary education is available are quite different from one another even though both are private.
4. Among the several recent books and reports with this theme are the following: *The AAUW Report: How Schools Shortchange Girls*, researched by the Wellesley College Center for Research on Women (Susan Bailey et. al.), (Washington, DC.: The American Association of University Women Educational Foundation, 1992); Peggy Orenstein, *SchoolGirls: Young Women, Self-Esteem, and the Confidence Gap*, in association with the American Association of University Women. (New York: Doubleday, 1994); Myra and David Sadker, *Failing at Fairness: How America's Schools Cheat Girls* (New York: Scribners, 1994).
5. See Lee, "Gender Equity and the Organization of Schools"; Valerie E. Lee, Xianglei Chen, and Becky A. Smerdon, *The Influence of School Climate on Gender Differences in the Achievement and Engagement of Young Adolescents*, commissioned by the AAUW Educational Foundation (Ann Arbor, Mich.: The University of Michigan, 1996).
6. For more discussion on the "file-drawer" issue, see Richard J. Light and David B. Pillemer, *Summing Up: The Science of Reviewing Research* (Cambridge, Mass.: Harvard University Press, 1984): 78-79 and Robert Rosenthal and Ralph L. Rosnow, *Essentials of Behavioral Research: Methods and Data Analysis* (New York: McGraw-Hill, 1984): 379-392.
7. Rosenthal and Rosnow, *Essentials*, p. 379.
8. Of course, differences could be in either direction (i.e., they could favor single-sex or coeducational schools). However, the general direction of findings is in favor of single-sex schooling.

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9 See Valerie E. Lee and Anthony S. Bryk, "Effects of Single-Sex Secondary Schools on Student Achievement and Attitudes," *Journal of Educational Psychology*, 78, no 5 (1986):381-395; Valerie E. Lee and Helen M. Marks, "Sustained Effects of the Single-Sex Secondary School Experience on Attitudes, Behaviors, and Values in College," *Journal of Educational Psychology*, 82, no. 3 (1990): 378-392; and Chapter 9 in Anthony S. Bryk, Valerie E. Lee, and Peter B. Holland, *Catholic Schools and the Common Good* (Cambridge, Mass.: Harvard University Press, 1993).

10 Valerie E. Lee and Helen M. Marks, "Who Goes Where? Choice of Single-Sex and Coeducational Independent Secondary Schools," *Sociology of Education* 63, no. 3 (1992): 226-253; Valerie E. Lee, Helen M. Marks, and Tina Byrd, "Sexism in Single-Sex and Coeducational Independent Secondary School Classrooms," *Sociology of Education* 67, no 2 (1994): 92-120; and Valerie E. Lee, Susanna Loeb, and Helen M. Marks, "Gender Differences in Secondary School Teachers' Control Over Classrooms and School Policy," *American Journal of Education* 103 (1995): 259-301.

11 The magnitude of effect sizes that were statistically significant rarely were over .2 SD (standard deviation units) in magnitude, and many were smaller. Rosenthal and Rosnow, *Essentials of Behavior Research*, provides a useful standard for the substantive interpretation of effect sizes in SD units. Effects over .5 SD are considered large; effects .3- 5 SD are moderate; effects in the .1- 3 SD range are small; and effects less than .1 SD are trivial.

12 Bryk, Lee, and Holland, *Catholic Schools and the Common Good*.

13 Lee, Chen, and Smerdon, *The Influence of School Climate*.

14 Though this discussion is based on findings from studies my colleagues and I have conducted (listed in Note 13), we have also found considerable support for the value of these organizational features in the literature. For an extensive review, see Valerie E. Lee, Anthony S. Bryk, and Julia B. Smith, "The Organization of Effective High Schools," in L. Darling-Hammond, ed., *Review of Research in Education 20* (Washington, DC.: American Educational Research Association, 1993): 172-267.

15 Valerie E. Lee and Julia B. Smith, "Effects of School Restructuring on the Achievement and Engagement of Middle-Grade Students," *Sociology of Education* 66, no 3 (1993):164-187; Valerie E. Lee and Julia B. Smith, "Effects of High School Restructuring and Size on Gains in Achievement and Engagement for Early Secondary School Students," *Sociology of Education* 68, no 4 (1995) 241-470; Valerie E. Lee and Julia B. Smith, "Collective Responsibility for Learning and Its Effects on Gains in Achievement for Early Secondary School Students," *American Journal of Education, 104*, no 2 (1996):103-147; Valerie E. Lee, Julia B. Smith, and Robert G. Croninger, "How High School Organization Influences the Equitable Distribution of Learning in Mathematics and Science", *Sociology of Education 70* no 2 (1997):128-150; and Valerie E. Lee and Julia B. Smith, "High School Size: Which Works Best and for Whom?" *Educational Evaluation and Policy Analysis 19* no 3 (1997): 205-227.

16 Valerie E. Lee, Julia B. Smith, and Madalyn Cioci, "Teachers and Principals: Gender-Related Perceptions of Leadership and Power in Secondary Schools," *Educational Evaluation and Policy Analysis 15* no 2 (1993):153-180 and Lee, Loeb, and Marks, "Gender Differences in Secondary School Teachers' Control."

17 Helen M. Marks, "The Effect of Participation in School-Sponsored Community Service Programs on Student Attitudes Toward Social Responsibility" (doctoral dissertation, University of Michigan, 1994).

18 Lee and Bryk, "Effects of Single-Sex Secondary Schools," Lee and Marks, "Sustained Effects."

19 I have often wondered why gender separation is seen as an appropriate solution to the problem of gender inequity, when few would recommend separating the races for classes or for schooling as a solution to problems of race differences in educational outcomes. Though students of different races are actually separated "de facto" quite often in classes and in schools, few recommend separation as a policy option to decrease social inequity. Rather, such separation is often seen as a cause of social inequity.

20 Lee, Marks, and Byrd, "Sexism in Single-Sex and Coed Classrooms." In some coeducational independent schools in our sample, the proportion of girls was much lower than that of boys. (In some schools, girls made up only one-third of the students.) This resulted in some seriously imbalanced classes (like calculus and chemistry) where girls were only a small minority of the students. Girls did not receive equal treatment in those settings.

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The Future of Single-Sex Schools

Cornelius Riordan

I am delighted to share my views on single-sex schooling with you today. I am also very pleased that the AAUW Educational Foundation has chosen to address this topic, which is especially salient in view of the previous reports by the Foundation, especially *The AAUW Report: How Schools Shortchange Girls* and *Hostile Hallways: The AAUW Survey on Sexual Harassment in America's Schools*.[1] These reports identify and describe the range and the depth of problems for girls in coeducational schools. Clearly, the potential offered by single-sex schools requires consideration.

The research issues that I wish to briefly address are these:

- What do we know about school effects generally and single-sex schools specifically?
- Why do single-sex schools work?
- Can the favorable characteristics of single-sex schools be applied to coeducational schools?
- How do we measure success in school outcomes?
- What is the future for research and practice in single-sex schools?

What Do We Know About the Effects of Different Types of Schools?

Here I state four findings that I believe can be accepted as social facts since they rest on sound sociological and educational theory and research, and that are pertinent to the topic.

1. The academic and developmental consequences of attending one type of school versus another type of school are virtually zero for middle-class or otherwise advantaged students; by contrast, the consequences are significant for students who are or have been historically or traditionally disadvantaged—minorities, low- and working-class youth, and females (so long as the females are not affluent). Furthermore, these significant effects for at-risk students are small in comparison with the much larger effects of home background and type of curricu-

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lum in a given school.[2] We need to understand that all the hollering about types of schools applies only to these students.

2. Equality of treatment, access, and/or outcomes is a scarce commodity in coeducational schools. Coeducational schools are male-dominated and male-controlled cultural institutions. This dominance is not mitigated whatsoever by the fact that females achieve higher grades, have higher educational and occupational expectations, higher reading and writing test scores, or any other benchmark indicator. Even if females had equal or higher math and science test scores than males, this is all washed away every time there is a football or basketball game, and it all culminates in the celebration of male dominance with the Super Bowl and the Final Four. Many of you understand experientially better than I that these above-named sporting events are merely symbolic, and that the real thing occurs probatively on a daily basis in and out of school, on TV, at family gatherings, etc., etc., ad infinitum. Moreover, the manifestation of male dominance is by no means limited to the sports scenarios that I have identified. This claim is confirmed by a full array of research, independent of the well-known reports by the AAUW Educational Foundation.

3. Single-sex schools work.[3] They work for girls and boys, women and men, whites and nonwhites, but this effect is limited to students of low socioeconomic status (SES), and/or students who have been disadvantaged historically—females and racial/ethnic/religious minorities (both males and females). The effects of single-sex schools are greatest among black or Hispanic females from low socioeconomic homes. These students possess three low-status characteristics: female, racial minority, low SES. Likewise, the strength of the effects diminish slightly for black and Hispanic males from low-socioeconomic homes who have two low-status characteristics. Similarly, the effects are smaller still for white middle-class females who have a single low-status characteristic. The effects are virtually nonexistent among affluent students regardless of race or gender. Over the past two decades, the data persistently confirm this educational fact, which is fully consistent with #1 above.

Recent research on Catholic schools in the 1990s has found that students in single-sex schools do not outperform their counterparts in coeducational schools.[4] This is contrary to the results obtained by Lee and Bryk, and Riordan for Catholic school students in the 1980s.[5] This is completely consistent since students in Catholic schools have become increasingly affluent over the past 10 years.[6] Valerie Lee also found no differences in educational achievement between students in single and mixed-gender elite independent schools.[7]

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These positive effects, however, are not universal. In a cross-national study of four countries (Belgium, New Zealand, Thailand, and Japan), David Baker, Maryellen Schaub, and I have shown that single-sex schools do not have uniform and consistent effects.[8] The effects appear to be limited to those national educational systems in which single-sex schools are relatively rare. We argue that the rarity of a school type may enhance single-sex effects under certain conditions. When single-sex schools are rare in a country, the pro-academic choice made by parents and students will result in a more select student body, which will bring with it heightened academic demands. In turn, we believe that rare school types are better able to *supply* the quality of schooling *demanded* by these more select students. Being less normative, these schools are likely to possess greater autonomy.

4 Schools that increase both academic achievement and equity are characterized by a set of identifiable features. In a set of studies that rest on sound theoretical and empirical grounds, Valerie Lee and her associates have identified several structural and organizational features of schools that generate increased academic achievement as well as increased equity among the students (a decrease in the gap between racial and social class groups).[9] Drawing upon these studies in coeducational schools and her own studies of single-sex schools, Lee argues that single-sex schools possess these same features.[10] I have numbered these positive features of schools as 9 to 12 in the next section since I see them as additional explanations for the single-sex school effects. They indeed would become "institutional characteristics" that follow upon a pro-academic choice.

Why Do Single-Sex Schools Work?

There are at least a dozen theoretical rationales that provide support for the contention that single-sex schools may be more effective academically than mixed sex schools, especially for minorities and white females. Each of these rationales is less applicable when the schools and the students are mostly from high socioeconomic home backgrounds, and/or if single-sex schools are normative in the society or in a subculture. These rationales are as follows:

1. The diminished strength of youth-culture values;
2. A greater degree of order and control;
3. The provision of more successful role models, especially student role models;
4. A reduction of gender differences in curriculum and opportunities;
5. A reduction of gender bias in teacher-student interaction;
6. A reduction of gender stereotypes in peer interaction;
7. The provision of a greater number of leadership opportunities;

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8. A pro-academic parent/student choice;
9. Smaller school size;
10. A core curriculum emphasizing academic subjects taken by all students (organization of the curriculum);
11. Positive relationships among teachers, parents, and students that lead to a shared-value community with an emphasis on academics and equity (school social organization);
12. Active and constructivist teaching and learning (organization of instruction).

Single-sex schools provide more successful same-sex teacher and student role models, more leadership opportunities, greater order and discipline, and fewer social distractions from academic matters. Moreover, the choice of a single-sex school is a pro-academic choice. (For an elaboration of rationales 1-8, see Riordan, 1990, 1994.) Females also gain advantages because of significant reductions in gender bias in both teaching and peer interaction, and via access to the entire curriculum; the reverse may be true for black males. The schools are typically smaller and provide the academic climate features (9-12) noted by Lee and her colleagues.[11] Lee also argues that these organizational differences explain the greater effectiveness of single-sex schools.[12] Obviously, I agree. But these explanatory variables are set into motion because of an independent variable, which is school type (single or coeducational). You can't just assume that the explanatory variables can be easily operationalized by well-intended educational policymakers and/or administrators.

Single-sex schools are places where students go primarily to learn, not to play, hassle teachers and other students, or simply meet their friends and have fun. Coeducational schools, except for those in affluent middle-class communities, and private and alternative schools, are not at all about academics. This has been noted often and with alarm by respected and distinguished investigators across a variety of disciplines using a variety of methodologies.

Over the course of time, I have come to see the pro-academic choice that is made by parents and students as the key explanatory variable. This choice sets into motion a set of relationships among teachers, parents, and students that emphasize academics and de-emphasize youth-culture values, which, as I have suggested above, dominate coeducational schools. I want to be absolutely clear about this point: It is not at all about sex and romance, nor is it about exclusion; it is all about the rejection of anti-academic values that predominate our culture and our schools. Moreover, this rejection comes from the bottom up (that is, from students) rather than the top down. In my view, it drives all that follows.

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Can the Favorable Benefits of Single-Sex Schools Be Applied to Coeducational Schools?

The pro-academic environment of single-sex schools is a function of the choice-making process by students who attend single-sex schools. In this regard, it is entirely different from a set of structures or programs that are put into place by educators. In single-sex schools, the academic environment is normative in a true sociological sense. It is a set of rules established by the subjective reality (definitions) of participants that takes on an objective reality as a set of social structural norms.[13] Moreover, as I have indicated above, these academic definitions of school contradict the nonacademic definitions that students will otherwise bring to school and that come to constitute a youth culture. In effect, single-sex schools mitigate the single largest obstacle that stands in the way of effective and equitable schooling, and it does this by using a fundamental sociological principle of how real social structures are created. Structures that are imposed and that contradict deeply cherished beliefs (regardless of how wrong-headed and problematic such beliefs may be) will be rejected out of hand by any group with substantial power in numbers, such as students in schools.

In an ongoing research project at the Regional Educational Laboratory at Brown University, a group of researchers are investigating the extent to which a focus on student characteristics may affect the structure and organization of school.[14] This is a quite different notion than simply asking how school structures affect student outcomes. It posits that the cause and effect relationship is reciprocal. And I think that the existence and the importance of this reciprocal relationship has been established in our work this past year. The research involves school site visits and interviews with principals. Our basic premise is that a focus on a student characteristics such as race or gender shapes the structure and the culture of schools. And that these structures then provide a "culturally responsive" and "caring" teaching and learning environment.

Among these schools is one with a student focus on African Americans with an Afrocentric curriculum; another has a focus on Hispanic Americans and provides a unique bilingual curriculum in which nearly everything is taught twice to everyone in the school—once in Spanish and once in English. A third school is the Manhattan Comprehensive Day and Night School, which is open in two shifts that run from 8:00 A.M. to 11:00 P.M. The focus is on students who have left school and have to work full-time either during the day or night. All of these schools are able to provide an academic school structure as a result of this student-centered curriculum. Compared to single-sex schools, however, these other alternative schools must still cope with the problems that are inherent in coeducational schools, to which I have alluded earlier.

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The challenge of effective and equitable schooling in the next century is to overcome the resistance and the recalcitrance of youth cultures in and out of the school. This is not a new problem and undoubtedly predates the modern school. But the intensity and the complexity of the problem is new, and it is the most important obstacle in the schools today. It is not just about youthful anti-intellectualism; it is not just about antisocial behavior; it is not just about athletics and rock concerts; it is not just about sexual harassment; it is not just about heterosexual attraction and subsequent distractions; it is not just about the contentiousness that comes from increased diversity in the schools; it is about all these things and more.[15]

How do schools get to be small or how do they develop communal relationships, authentic instruction, and/or a core academic curriculum? How can schools provide more successful academic role models and reduce the strength of anti-academic youth-culture values? In essence, this requires reconstruction of schools. It requires a pro-academic choice on the part of administrators, teachers, parents, and students. Of these, I argue that students are the key stakeholders.

How Do We Measure Success in School Outcomes?

Underlying much of what I have said above is that the key measures of success in school are academic achievement and gender equity. Given that achievement and equality are long recognized as the twin goals of schooling in democratic societies, I believe that cognitive achievement, however it is measured, is the defining outcome of school and that gender equity is obtained by comparing the achievement levels of females and males.

Many researchers have examined the concept of self-esteem as an outcome measure. There is little agreement on what factors influence self-esteem and whether or not a school type (single-sex or coeducational) has any significant effect. The literature review by Pamela Haag (see "Single-Sex Education in Grades K-12: What does the Research Tell Us?" in this volume) confirms this inconsistency.[16] A much more important attitudinal outcome measure of success is the degree of environmental control (locus of control).

Self-esteem is an attitude that an individual takes toward oneself. Although it is surely conditioned by the environment, it is experienced by the individual as being independent of the environment. Thus, a person may feel that "I am able to do things as well as most other people" knowing full well that there are many obstacles—or just a few—to actually accomplishing certain tasks or goals. Feelings of high or low self-esteem are much like feelings associated with personality such as shyness or extroversion. A feeling of environmental control, however, is some-

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thing quite different. Unlike self-esteem, it directly indicates the extent to which an individual feels that the social environment either facilitates or hinders the undertaking and completion of tasks and goals. Thus, an individual may possess high self-esteem and low environmental control. This may often be the case with members of minority groups and females.

In my research on African and Hispanic American students in single-sex and coeducational Catholic schools, I found that both males and females gained a significantly greater sense of environmental control over the last two years of high school, even after controlling for initial scores on the attitude measure, initial test scores, and home background.[17] Moreover, this environmental control gain is entirely explained by the formal and informal single-sex school advantages; namely, higher track placement, greater homework, greater parental interest, more same-sex role models, and greater discipline. This may be the most important effect of single-sex schools for black and Hispanic students. *Notwithstanding other gains or losses that may result, single-sex schools provide an atmosphere that "empowers" African and Hispanic American students.*

Although there are several other measures of success that merit discussion (satisfaction with school, identity formation, attitudes towards the opposite sex), I wish to address another related matter that is quite important. How should we control for the distinct possibility of "selection bias" in studies of single- and mixed-gender schools? All researchers acknowledge that students attending each type of school vary in a number of ways, including socioeconomic status (SES), previous academic achievement, educational expectations, etc. And everyone agrees that we need to statistically control (and thereby equate) these pre-existing characteristics if we are to sort out the effects of the school from the effects of the home. I part company from those who believe that the appropriate strategy is to control or equate exhaustively. If we do, we end up controlling some of the very characteristics that I maintain drive the entire success of single-sex schools—making a pro-academic choice. Hence, my view is that we need to control for factors that pertain to home background resources such as socioeconomic status and prior academic achievement such as test scores. But not much else, and certainly not educational expectations or similar variables, which measure and may distinguish students in terms of the value they place on academics. In fact, having controlled for social class and academic achievement, I would fully expect that students in single-sex schools will have higher educational expectations than students in coeducational schools. (It is worth a moment to consider the irony of refusing to allow such students to attend a school that will help them achieve their high educational expectations, especially when the students are desperate, poor, and powerless.)

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What Additional Research is Needed?

Virtually all of the research on single-sex schools in this country has been done with Catholic or other types of private schools. Although there still remains important research that should be done in these settings, the pressing need is for research in public schools. The lack of such research, in fact, is the basis for unfounded criticism of the research generally—that is, is the research on private schools relevant to public schools? Critics have prematurely concluded that the answer is no. Now the opportunity presents itself to do this research. In California, some 10 single-sex schools for boys and girls (along with a coeducational alternative) will be established in 1997-1998.

Another fruitful avenue of research would be to renew and extend the type of work undertaken in the 1970s and 1980s by Elizabeth Cohen and Marlaine Lookheed.[18] In Cohen's studies and numerous replications, it was found that simply placing black and white students in what appeared to be an equal-status problem-solving situation was *insufficient* to guarantee equal status outcomes. In fact, the studies documented and reported manifestations of racism—that is, white dominance. Moreover, in these studies, extensive efforts were made to alter the interaction pattern of white dominance with little success, except under one condition in which the black students were literally allocated to a dominant role *vis a vis* the white students who were allocated a submissive role. These results led Cohen and Roper to conclude that

> The oft made assumption that one has only to join blacks and whites on an officially "equal" footing in the same building for "equal status" relations to develop is not sound ... Belief systems concerning race and other status characteristics are so powerful that they will likely reinforce rather than damage stereotypical beliefs.[19]

The Cohen and Roper experiment was part of a large research program in expectation states theory that conducted many other studies using what has come to be known as a "standard" research situation. In fact, numerous experiments have been conducted using these procedures on mixed-gender interaction. Marlaine Lockheed conducted a meta-analysis of 29 studies yielding 46 conditions.[20] The results of Lockheed's analysis were clear: Mixed-gender interaction is characterized by male dominance unless strenuous efforts are made to intervene. Moreover, it seems insufficient to merely "equate" the conditions since male dominance remains. Only by providing some form of female expectancy advantage are we able to consistently obtain equal status interaction. Remarkably, one form of intervention that demonstrated positive equal status outcomes was to allow females to work on a related problem-solving task by themselves, prior to interaction with males.[21]

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Conclusions

You don't have to be a social scientist to identify the characteristics of a "good" school. Such schools would include all of the characteristics that I have identified earlier in this paper, although this list is certainly not exhaustive. One can certainly try to set this up by instituting rules and regulations, structures and norms from the desks of either superintendents and/or principals. And in lieu of any other alternative, this is how it will be done. But institutions simply do not work very well that way, especially when the clients are youth, who understandably and justifiably want a stake in the creation of social organizations that ultimately control their behavior. Single-sex schools provide an avenue for students to make a pro-academic choice, thereby affirming their intrinsic agreement to work in the kind of environment that we identify as an effective and equitable school.

Can coeducational schools be structured so that students can make a pro-academic choice? It might be possible in an alternative or charter school where students can choose to attend or to remain in their assigned public coeducational school. Even here, however, the gender context remains coeducational with all of its vulnerability to control by youth culture and male-dominated values. In regular coeducational public schools, however, it is virtually impossible. The entire matter is circumscribed and frozen by the recalcitrance of a society that continues to prioritize sports, recreation, and entertainment above that of the arts, science, and literature. Single-sex schools should not be expected to correct the gender-equity problems that exist in society and in coeducational schools. Nor should anyone fear that their existence would detract in any way from efforts that should be made to provide greater gender equity in public coeducational schools.

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Notes

1. *The AAUW Report: How Schools Shortchange Girls*. Researched by the Wellesley College Center for Research on Women (Susan Bailey et al.) (Washington, DC: The American Association of University Women Educational Foundation, 1992). AAUW Educational Foundation, *Hostile Hallways: The AAUW Survey on Sexual Harassment in America's Schools*. Researched by Harris/Scholastic Research (Washington, DC: The American Association of University Women Educational Foundation, 1993).
2. Cornelius Riordan, *Equality and Achievement: An Introduction to the Sociology of Education* (New York: Addison Wesley Longman, 1997).
3. Cornelius Riordan, *Girls and Boys in School: Together or Separate?* (New York: Teachers College Press, 1990); Cornelius Riordan, "Single-Gender Schools: Outcomes for African and Hispanic Americans," *Research in Sociology of Education and Socialization 10* (1994): 177-205.
4. Paul C. LePore and John Robert Warren, "A Comparison of Single-Sex and Coeducational Catholic Secondary Schooling: Evidence From the National Educational Longitudinal Study of 1988," *American Educational Research Journal 34* (1997): 485-511.
5. Valerie E. Lee and Anthony S. Bryk, "Effects of Single-Sex Secondary Schools on Student Achievement and Attitudes," *Journal of Educational Psychology 78* (1986): 381-395; Cornelius Riordan, *Girls and Boys in School: Together or Separate?* (New York: Teachers College Press, 1990).
6. David P. Baker and Cornelius Riordan, "The 'Elitist' of the Common American Catholic School and the National Educational Crisis" (Paper presented at the annual meeting of the American Sociological Association, 1997); Cornelius Riordan, "Trends in Student Demography, Attitudes, and Behavior in Catholic Schools 1972 to 1992" (Paper commissioned by the Future of Catholic Schools Project, Washington, DC: The Catholic University of America, 1997).
7. Valerie E. Lee, "Gender Equity and the Organization of Schools," in Barbara J. Bank and Peter M Hall (eds.) *Gender, Equity, and Schooling* (New York: Garland Publishing, Inc., 1997).
8. David P. Baker, Cornelius Riordan, and Maryellen Schaub, "The Effects of Sex-Grouped Schooling on Achievement: The Role of National Context" *Comparative Education Review 39* (1995): 468-481.
9. Lee, "Gender Equity and the Organization of Schools."
10. Ibid.
11. Ibid.
12. Ibid., 156.
13. Peter L. Berger and Thomas Luckman, *The Social Construction of Reality* (Garden City, N.J.: Doubleday-Anchor, 1967).
14. LAB (Northeast and Islands Regional Educational Laboratory at Brown University), Student-Centered Schools: Project Design and Action Plan (Unpublished manuscript, 1997).
15. Laurence Steinberg et al., *Beyond the Classroom* (New York: Simon and Schuster, 1996); John Goodlad, *A Place Called School* (New York: McGraw Hill Book Company, 1984).
16. Pamela Haag, "Single Sex Education: What Does the Research Tell Us" (Paper in this volume, 1998).
17. Cornelius Riordan, "Single-Gender Schools: Outcomes for African and Hispanic Americans," *Research in Sociology of Education and Socialization 10* (1994): 177-205.
18. Elizabeth G. Cohen and Susan S. Roper, "Modification of Interracial Interaction Disability: An Application of Status Characteristic Theory," *American Sociological Review 37* (1972): 643-657; Marlaine E. Lockheed, "Sex and Social Influence: A Meta-Analysis Guided by Theory," in Joseph Berger and Morris Zelditch, Jr. (eds.) *Status, Rewards, and Influence* (San Francisco: Jossey-Bass Publishers, 1985): 406-427; Marlaine E. Lockheed and Katherine Patterson Hall, "Conceptualizing Sex as a Status Characteristic: Applications to Leadership Training Strategies," *Journal of Social Issues 32* (1976): 111-124.
19. Cohen and Roper, "Modification," 645, 657.
20. Lockheed, "Sex and Social Influence."
21. Lockheed and Hall, "Conceptualizing Sex."

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What's Sex Got to Do With It? Simplistic Questions, Complex Answers[1]

Patricia B. Campbell and Ellen Wahl

The linguist Noam Chomsky uses the sentence "Colorless green ideas sleep furiously" to make the point that a sentence may be linguistically correct but still make no sense.[2] Similarly, while the question "Are single-sex classes better than coed classes?" sounds logical, it makes little sense when it doesn't include what goes on in the classes, the pedagogy and practices of the teachers, or anything about the students other than their sex. Yet the public, media, and even some researchers compare classes and attribute outcomes to this single factor of whether the class is all girls, all boys, or girls and boys together. We can assume that most parents would prefer that their child be in a good single-sex math class rather than a bad coed one. We can also assume that these same parents would prefer a good coed math class over a bad single-sex class.

In this paper, we look at the research on single-sex and coed classrooms and explore why such a simplistic question is being asked about such a complex topic. We examine why so many people have already decided what the answer is regardless of what the research says. Finally, we suggest ways to reframe the questions to acknowledge the interplay of factors involved in promoting high-quality education for girls and for boys, so that educators and the public can make considered decisions about policy and practice.

During the past five years, single-sex classes have been set up in public schools from Cocoa Beach, Florida, to Presque Isle, Maine, and from New Bedford, Massachusetts, to Ventura, California, with many more communities discussing their establishment. While there have been no surveys or formal counts of single-sex classes, anecdotal data indicate that the classes are overwhelmingly for girls, primarily at the middle school level and almost always in mathematics or the sciences. In general, these classes are seen as a way to address girls' lower levels of achievement and participation in advanced mathematics and physics courses, as well as women's much lower rates of employment in engineering and the physical sciences.[3] Whether these classes are

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legal within the context of public schooling is in question, and limitations on what is legal may affect how the developers of single-sex classes explain their purposes (for instance, using the notion of all-girls' classes for "remediation" or "compensation," which has standing in legal arguments as a way to equalize opportunity).

These are good faith efforts, attempts to remedy situations of inequity or promote higher-quality education for the students in question. They appear to have been influenced by the popularization of ideas about gender issues in education, such as the differential amount and quality of attention girls and boys receive in the classroom.[4] Myth and popular notions, however, seem to be mixed up with what is actually known from research about the efficacy of single-sex classes compared to coed ones.

The Problems With the Existing Research

In fact, the sheer size of the base of research comparing single-sex and coed classes in the United States and in other countries is quite small. Within that small body of research, results must be interpreted with caution. Most of the studies do not control for such important variables as the teacher, the curriculum, and student self-selection. If a single-sex class taught by one teacher is compared to a coed class taught by another teacher, there is no way of telling what proportion of any difference found is due to the teacher and how much is due to the sex breakdown of the class. On the positive side, since comparisons of single-sex and coed classes are usually made of classes within the same school, there are fewer differences in student socioeconomic status and available resources than there are in comparisons of single-sex and coed schools.

Within the research that does exist, results are not consistent. For example, in studies of achievement, one study found no differences in girls' subsequent math and science course taking[5] while another found short-term but not long-term gain.[6] No differences in grades or SAT scores between girls in single-sex math classes and girls in coed classes were reported by one group of researchers,[7] while other researchers found single-sex groupings had little effect on the achievement scores of either males or females,[8] and yet another[9] identified short-term but not long-term achievement gains for girls in single-sex classes.

In studies of attitudes, girls in single-sex classes have been found to have noticeably more favorable attitudes toward science and mathematics than girls in coed classes.[10] However, in one of those cases, the girls in the single-sex classes became more personally negative about mathematics at the same time that they became more positive about girls doing mathematics.[11] Still, teachers,

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researchers, and students all said that girls in coed classes participated less, were less extroverted, had less interaction with the teacher, and were subject to more harassment from other students than girls in single-sex classes."[12]

There is much that the research has not yet addressed. Few studies have explored qualitatively or quantitatively what in fact does take place with regard to content, pedagogy, interaction, social organization, or climate in differently constituted classrooms. We do not have research-based knowledge of what features, practices, or conditions of single-sex or coed classrooms promote better or different outcomes for girls or boys. The purposes and premises underlying different attempts at single-sex education are rarely included as part of the outcomes that are measured. There is a consequent lack of attention to what constitutes successful outcomes; for example, is success in achievement measured simply by greater gains, by gains that close the gap in achievement between groups, or by acquisition of skills and knowledge in relation to standards?

The results from the above studies are ambiguous at best, and indicate there is no clear evidence to support the claim that single-sex classes are better for girls. Yet interest in single-sex classes is growing as is an erroneous belief that research clearly supports this claim. Examples of this erroneous belief can be found in sources as diverse as the *New York Times* and the Ukiah (CA) local Point/Counterpoint website. For example, a September 27, 1997 *New York Times* editorial explained, "The impetus for the new school was studies showing that girls, particularly girls from poor neighborhoods, learn better when boys are not in class," with no references or data to support their claim. Similarly, again without references or data, a September 19, 1997 Point/Counterpoint questioned "why sexual segregation builds such self-confidence and provides the best education."[13]

Assumptions that Deserve Questioning

Why is there such a disconnect between what the research says and what people believe? To answer this question, we need to look at some assumptions that may be behind these inaccurate conclusions. Eliyahu Goldratt's comment about identifying the source of error may be illuminating here:

> When I was a physicist, people would come to me from time to time with problems in mathematics they could not solve. They wanted me to check their numbers for them. But after a while I learned not to waste time checking the numbers—the numbers were almost always right. However, if I checked the assumptions, they were almost always wrong."[14]

We suggest that there are at least four assumptions in need of questioning, before we consider future directions for research and action.

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Questionable assumption 1. Girls and boys are opposites with different skills, interests, and learning styles. Thus, one or both sexes are better served by single-sex classes.

Questionable assumption 2. Boys will be boys and little, if anything, can be done to stop boys from disrespecting girls and creating a difficult environment. Thus, girls are better served in single-sex classes.

Questionable assumption 3. Gender equity refers to fairness for girls. Thus, the focus should be on what works for girls, in whatever setting.

Questionable assumption 4. Our efforts to reduce the gender gaps in subjects such as math and science, or in promoting coed environments that serve both boys and girls, have not been successful. Thus, single-sex classes are the only option left for addressing the inequities.

As is so often the case, reality is much more complex than beliefs, especially beliefs about the opposing nature of females and males. While there are some differences between the average girl and the average boy, there are much greater differences among girls and among boys than there are between girls and boys. Just knowing if someone is a girl or a boy tells you nothing about the person's math skills, athletic interests, or even level of aggression. While the average boy is more aggressive than the average girl, there are many girls who are more aggressive than most boys.[15] Analyses of thousands of studies have found that gender differences in cognitive and affective areas are relatively small and becoming smaller.[16] For example, the degree of overlap in girls' and boys' math skills has been computed to be between 98 and 99 percent,[17] while in verbal skills the degree of overlap has been found to be 96 percent.[18]

The second assumption implies that negative behavior by boys is inevitable, tolerable, and impossible to change. Looking at the research, there is some indication that boys are more apt to cause disruption in classrooms than are girls, and that boys get more positive and negative attention in classes than do girls.[19] Indeed, one study found that teachers were surprised at the extent to which the dominant and harassing behavior of boys was impeding girls' educational progress.[20] Their surprise is revealing both of their tolerance of disrespectful behavior and their lack of awareness of how a hostile climate affects educational participation. But the research also indicated that girls were not the only ones whose education was negatively affected. The same study found that while girls in single-sex classes received the least amount of harassment from other students, boys in single-sex classes received the most.[21] From controlled research studies to newspaper articles, it has been found that many fewer boys than girls prefer single-sex classes.[22]

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Even teachers preferred coed over single-sex classes for boys.[23] This may just mean that girls, boys, and teachers tend not to like hostile classroom climates.

Clearly, stereotypical gender expectations are a major concern in the construction of positive environments for learning for both girls and boys. The National Women's Law Center worries that "when the design of single-sex schools or programs is premised on fixed notions about what women as a group are like or what women as a group are capable of, it tends to reinforce limiting stereotypes that create barriers to women's advancement."[24] These fixed notions tend to ignore issues of sexual orientation as well. Indeed the adult assumption that single-sex education eliminates sexual tensions or distractions denies the existence of homosexual and bisexual youth.

The role of the teacher as leader, rule-maker, and shaper of the social organization is key to making education work. But teachers' roles and responsibilities have not been given the attention they deserve in the studies or in gender issues in education generally. Indeed, there have been only minimal attempts of any sort to develop, monitor, and evaluate truly equitable classroom environments, and to analyze how equity and excellence are linked with respect to opportunity, treatment, and outcome in these settings.

The third assumption is that gender equity is only about girls, that the problems of inequitable access and outcomes in education affect only girls, and that the benefits of the solutions accrue only to girls. This assumption derives in part from the gender equity field itself, which began with a focus on girls and women. In recent years, we have seen a gradual shift toward a definition that includes the condition of being male or female in this or any other society, and the resources, rights, and privileges, as well as the limitations and costs associated with that condition. Viewing the issue from only the perspective of effect on girls inevitably has an impact on both research design and conclusions. It also negatively affects public policy conversations, setting up the familiar and useless debate that begins with "What about the boys?" but more important, it runs counter to our efforts to transform the social organization of the classrooms, institutions, and society to promote high-quality outcomes for each and all.

The fourth assumption, that little has changed, taps into the understandable and admirable frustration of teachers and others at what appears to be the slow pace of change toward gender equity. In fact, there has been significant movement in the past years with regard to achievement and course enrollment, especially in mathematics and science. Girls are now taking mathematics through calculus in equal numbers to boys, and gender differences in general mathematics achievement have declined to almost nothing.[25] However, there is some indication that gender

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differences favoring boys are greater in more complex mathematical areas, such as problem solving, than they are in areas such as computation.[26] And after an initial surge, the numbers of young women going into mathematics-related careers such as engineering and computer science has plateaued and in some cases declined.[27] Yet there has been enough change that one research study of single-sex and coed schools concluded, "It would be naive to suggest that schools have not responded to the recent focus on gender bias in schools and classrooms."[28]

A final assumption, often unstated, is that in this society higher status and privilege are associated with class (higher socioeconomic status), race (white), and gender (male). The highest-status students in coed classes tend to be white, male, and upper-middle-class; they in turn reap the benefits in the form of higher achievement and participation. If girls and boys are in separate classes, then highest-status students in all-boy classes remain the same, and upper-middle-class white girls become the highest-status students in their classes. This, we argue, does not count as significant progress.

Measuring progress at the classroom level is confusing. Gains in participation and achievement are often observed at the classroom level, but can not necessarily be attributed to changes that were implemented at the classroom level. An increase in the number of girls electing to take the full sequence of higher level math classes is a good example. Consider the interventions that may have had an impact on that outcome, all of which are external to the classroom. They might include a change by the district requiring four years of mathematics for graduation; more messages to girls from parents and guidance counselors about the importance of these courses for their future career and educational options; or the success of reform efforts at the district, state, or national level to require rigorous standards for content and participation by all students.

Refining the Research Questions

What, then, are the implications for research and action? Our research agenda needs to focus on complexity rather than single variable analysis and attribution. In short, our recommendations for research are to recognize the complexity: Design for it and control for it or describe it, and communicate it. We suggest a number of areas and ways of posing questions that might begin to respect this complexity. For example:

1. Look at outcomes in relation to premises and purposes. What is the rationale behind the establishment of the single-sex classroom within the context of the history of coeducation in this country? Is the single-sex classroom being established because of a belief that girls need

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more support and help (remediation) to achieve the same outcomes as boys)? Is it to provide experience, skills, and confidence (compensation) that have been denied to girls because of inequitable opportunities and low expectations in ways that might be different from what boys receive in class? Is it to separate boys from girls and protect each from the distractions (raging heterosexual hormones) the other brings to the learning process? Each has implications for what outcomes are valued and measured, and how success is judged.

2. Look at content and pedagogy in relation to the sex makeup of the classroom. If the research question continues to be, "Is single sex better than coed?" then it is essential to control for the content of the curriculum and the pedagogy. We, of course, would recommend asking different questions, such as "Does making a class single-sex or coed make a difference in the content and pedagogy?" in which case it is essential to control for the teacher and the resources provided; or asking "What is the impact of the sex of the students in the classroom on the pedagogy?" in which case we need to look at other possible influences on the choice of the pedagogy, such as teacher style or teacher expectations about the students and their needs. When the same teacher teaches single-sex male, single-sex female, and coed classes, what happens? Does the teacher change in her or his behaviors, approaches, or expectations as the year progresses, or from year to year? Do those classes in turn have effects on achievement or participation? What is the causality chain here? Is it single sex versus coed, or is it what happens in the classroom? Can you factor out what happens in the classroom from the sex of the students in the classroom? This may be the place to raise questions about what constitutes "rigor" and "seriousness". Do these terms refer to the amount or quality of the content, the way that students are pushed to their level of intellectual challenge, or the level or quality of the outcomes that are expected?

3. Look at classroom climate in both single-sex and coed classrooms in relation to the norms and rules, and in relation to the role of the teacher as leader and shaper of the social organization. In the coed classes where there was little or no disrespect of girls or boys, teachers all had explicit rules about no put-downs.[29] What is the effect of rules on disrespect in the classroom? How are norms established and sustained within classrooms regarding respect, tolerance, and non-exclusion on the basis of gender or other characteristics? What is the relationship between respect and learning, not just from the negative side (no one learns well in an environment of distrust and disrespect) but from the positive (does/how does an equitable environment contribute to excellence in outcomes?).

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We believe it is time to step back and focus attention on some of the questions that have not been asked in the discussions about single-sex education and coeducation. These are not all research questions, but are critical to shaping what we study, how we study, and why we study. First, what is a good education? Does it differ with respect to gender and equity? Can a good education be excellent if it isn't equitable, if it doesn't reach the vast majority of students—girls and boys of all colors and abilities? Does good education mean only the level and quality of the academic offerings? Does it refer also to socialization? Into whose culture, what norms, what kind of society? Does a good education differ for girls and boys? Do girls and boys need different things to get a good education? Does a good education differ if it's single-sex male, single-sex female, or coed? What is the differential education that girls and boys get, based on whether they're girls or boys, within classrooms of the same institution, or between institutions?

We are left with dilemmas. The first is a problem of building scientific theory on previous data. Conditions in the larger society around gender roles and expectations have changed dramatically since the research on gender was initiated in the early 1970s. What does that do to our earlier results, and what data and conclusions need to be reexamined and retested? At the very least, it suggests that we be very cautious in our use of older data and contextualize carefully our use of newer findings.

The second dilemma is more troubling. We have serious questions about the wisdom of proposing research about a strategy—single-sex classrooms in public education—that has questionable legality and questionable evidence of success. Devoting public dollars to this effort may not be an appropriate use of taxpayer funds.

In the end, our view is that the effort in both research and public policy needs to focus on what is needed to make the coeducational classroom fully equitable, promoting high-level outcomes for both girls and boys, in environments of high expectations, respect, participation, and civility. That needs to be the message to the research community, to the policy community, to parents, and to the public at large.

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References

The AAUW Report: How Schools Shortchange Girls. Researched by the Wellesley College Center for Research on Women (Susan Bailey et al.). Washington, DC.: AAUW Educational Foundation, 1992.

Campbell, Patricia B. and Jennifer Storo. "Making It Happen: Pizza Parties, Chemistry Goddesses and Other Strategies That Work for Girls and Others." Newton, Mass.: Education Development Center, 1996.

Campbell, Patricia B. and Ellen Wahl. "Of Two Minds: Single Sex/Co-Education and the Search for Gender Equity. *New York Law School Journal of Human Rights*. (In press).

Chomsky, Noam. *Syntactic Structure*. The Hague: Mouton Pub., 1957, 15.

Eagly, Alice and Valarie Steffin. "Gender and Aggressive Behavior: A Meta-Analytic Review of the Social Psychological Literature." *Psychological Bulletin* 100, no.3 (1986): 309-330.

Fennema, Elizabeth, Thomas P. Carpenter, Linda Levi, Janet Hyde, and Sarah Jaffee. "Gender Differences in Mathematical Thinking: A New Study and Reflections from Different Perspectives." *Educational Researcher* (In press).

Goldratt, Eliyahu and Jeff Cox. *The Goal*. Great Barrington, Mass.: North River Press, 1984.

Hyde, Janet. S. and Marcia Linn. "Gender Differences In Verbal Ability: A Meta-Analysis." *Psychological Bulletin* 104 (1988): 53-69.

Hyde, Janet, Elizabeth Fennema, and Susan J. Lamon. "Gender Differences In Mathematics Performance: A Meta Analysis." *Psychological Bulletin* 107, no. 2 (1990): 139-155.

LePore, Paul C. and John Robert Warren. "A Comparison Of Single-Sex And Coeducational Catholic Secondary Schooling: Evidence from the National Educational Longitudinal Study of 1988. *American Educational Research Journal* 34, no. 3 (1997): 485-511.

Lewin, Tamar. "In California, Wider Test of Same-Sex Schools." *New York Times*, 9 October 1997, Section A, pp. 1, 12.

Mullis, Rachel. "Point/Counterpoint." *ukiahilite*: September 19, 1996 website (http: www.ukiahilite.zapcom.net/pcp1.html

National Center for Educational Statistics. *Findings from the Condition of Education 1997: Women In Mathematics and Science*. Washington, DC.: National Center for Education Statistics (NCES 97-982). July 1997.

National Science Foundation. *Women and Minorities and Persons with Disabilities in Science and Engineering 1994*. Washington, DC.: National Science Foundation, 1994.

National Women's Law Center. *Single Sex Education After the VMI Decision*. Washington, DC.: National Women's Law Center, 1997.

Parker, Leslie. *A Strategy for Optimizing the Success of Girls in Mathematics. Report of a Project of National Significance*. Canberra, Australia: Commonwealth Schools Commission, 1985.

Parker, Lesley H. and Leonie J. Rennie. "Single Sex Grouping Issues for School Administrators." Paper presented to the annual meeting of the American Educational Research Association, New York, April 1996.

Smith, S. *Separate Tables? An Investigation into Single Sex Setting in Mathematics*. London: Her Majesty's Stationary Office, 1986.

Wood, Bonnie. "NCTM Talk." Paper presented to the annual meeting of the National Council of Teachers of Mathematics, 1995.

Wood, Bonnie S. and Lorrie A. Brown. "Participation in an All Female Algebra I Class: Effects on High School Math and Science Course Selection." *Journal of Women and Minorities in Science and Engineering* 3, no. 4 (1997): 265-278.

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Notes

1. Thanks are due to Kathryn Acerbo-Bachmann and Christina Boyer for their thoughtful review of early drafts of this paper.
2. Noam Chomsky, *Syntactic Structure* (The Hague: Mouton Pub., 1957), 15.
3. Patricia B. Campbell and Ellen Wahl, "Of Two Minds: Single Sex/Co-Education and the Search for Gender Equity" *New York Law School Journal of Human Rights*. (In press).
4. *The AAUW Report: How Schools Shortchange Girls*, Researched by the Wellesley College Center for Research on Women (Susan Bailey et al.), (Washington, DC.: AAUW Educational Foundation, 1992).
5. Bonnie S. Wood and Lorrie A. Brown, "Participation in an All Female Algebra I Class: Effects on High School Math and Science Course Selection," *Journal of Women and Minorities in Science and Engineering* 3, no. 4 (1997): 265-278.
6. Gilah Leder and Helen Forgasz, "Single Sex Mathematics Classes in a Coeducational Setting," paper presented to the annual meeting of the American Educational Research Association, Chicago, 1994.
7. Wood and Brown, "Participation," 265-278. This study did find that girls in the single-sex classes increased their math standardized achievement test scores between their 8th and 11th grades to a greater degree than did girls in the coed class. However, the use of *t* tests rather than analysis of variance with repeated measures in the analysis makes the results less reliable.
8. Leslie Parker, *A Strategy for Optimizing the Success of Girls in Mathematics. Report of a Project of National Significance* (Canberra, Australia: Commonwealth Schools Commission, 1985; Leder and Forgasz, "Single Sex Mathematics," 1994; K. Rowe, "Single Sex and Mixed Classes: The Effect of Class Type on Student Achievement, Confidence and Participation in Mathematics," *Australian Journal of Education* 32, no. 2: 180-202.
9. S. Smith, *Separate Tables? An Investigation into Single Sex Settings in Mathematics* (London: Her Majesty's Stationery Office, 1986).
10. Lesley H. Parker and Leonie J. Rennie, "Single Sex Grouping Issues for School Administrators," paper presented to the annual meeting of the American Educational Research Association, New York City, April 1995; Bonnie Wood, "NCTM Talk," presentation at the annual meeting of the National Council of Teachers of Mathematics, 1995.
11. Wood, "NCTM Talk," 1995.
12. Parker and Rennie, "Single Sex Grouping," 1995.
13. Point/Counterpoint Point Rachel Mullis ukiahlite 9/19/97 web site.
14. Eliyahu Goldratt and Jeff Cox, *The Goal* (Great Barrington, Mass.: North River Press, 1984).
15. Alice Eagly and Valarie Steffin, "Gender and Aggressive Behavior: A Meta-Analytic Review of the Social Psychological Literature," *Psychological Bulletin* 100, no. 3 (1986): 309-330.
16. Janet S. Hyde, Elizabeth Fennema & Susan J. Lamon, "Gender Differences in Mathematics Performance. A Meta Analysis," *Psychological Bulletin* 107, no. 2 (1990): 139-155; Janet S. Hyde and Marcia Linn, "Gender Differences in Verbal Ability: A Meta-Analysis," *Psychological Bulletin* 104 (1988): 53-69; Eagley and Steffin, "Gender and Aggressive Behavior," 1986.
17. Hyde et al. "Gender Differences in Mathematics," 1990.
18. Hyde and Linn, "Gender Differences in Verbal Ability," 1988.
19. *The AAUW Report: How Schools Shortchange Girls*, Researched by the Wellesley College Center for Research on Women (Susan Bailey et al.), (Washington, DC.: The American Association of University Women Educational Foundation, 1992).
20. Parker and Rennie, "Single Sex Grouping," 1995.
21. Ibid.
22. Tamar Lewin, "In California, Wider Test of Same-Sex Schools," *The New York Times* (October 9, 1997): Section A, pp. 1, 12.
23. Parker and Rennie, "Single Sex Grouping," 1995.

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24. National Women's Law Center, "Single Sex Education After the VMI Decision" (Washington, DC.: National Women's Law Center, 1997): 6.
25. National Center for Education Statistics, *Findings from the Condition of Education 1997: Women In Mathematics and Science* (Washington, DC.: National Center for Education Statistics (NCES 97-982). July 1997; Hyde et al, "Gender Differences in Mathematics," 1990.
26. Elizabeth Fennema et al., "Gender Differences in Mathematical Thinking: A New Study and Reflections from Different Perspectives." *Educational Researcher* (In press).; Hyde et al., "Gender Differences in Mathematics," 1990.
27. National Science Foundation, *Women and Minorities and Persons with Disabilities in Science and Engineering 1994* (Washington, DC.: National Science Foundation, 1994).
28. Paul C. LePore and John Robert Warren, "A Comparison of Single-Sex and Coeducational Catholic Secondary Schooling: Evidence from the National Educational Longitudinal Study of 1988," *American Educational Research Journal* 34, no. 3 (1997): 70-85.
29. Patricia B. Campbell and Jennifer Storo, "Making It Happen: Pizza Parties, Chemistry Goddesses & Other Strategies that Work for Girls and Others" (Newton, Mass.: Education Development Center, 1996).

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The Contexts of Single-Sex Classes

Diane S. Pollard

While there has been considerable furor in both public and educational spheres concerning proposed and existing single-sex schools during the past decade, somewhat less controversy has arisen over single-sex classes within mixed-sex schools. One reason for this may be that single-sex classes have become somewhat of a rarity in today's elementary, middle, and secondary schools, particularly in public schools. However, for a variety of reasons, a number of schools have begun to consider or experiment with single-sex classes. In this paper, I will discuss the implementation of single-sex classes from the perspectives of the goals of establishing such classrooms, the relationships between single-sex classes and the cultural context of schools, what might be learned from single-sex classes, and what further research is needed. I will focus primarily on public school contexts.

An Old Approach for New Purposes

Not so very long ago single-sex classes in coeducational schools were considered to be appropriate educative aspects of K-12 learning environments. As late as the 1960s or even into the early 1970s in some parts of the United States, girls and boys routinely were separated for some of their classes on a daily basis. The bases for single-sex classes varied. In some cases, students were placed in separate classes with different but presumably parallel subject matters. For example, in high schools across the country, girls went to home economics classes while boys went to "shop" or "agriculture" classes. These classes were strictly separated by sex and were usually required of all students. An assumption underlying these types of classes was that they were necessary to prepare girls and boys for the disparate roles they would assume as adults. In other cases, girls and boys were sent to separate classes in which the curriculum or subject matter was the same. Physical education and sex education were prime examples of these types of single-sex classes. In these cases, it appears that boys and girls were separated because of assumptions about their physical abilities and characteristics, their social and personal functioning, or because

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of beliefs held by adults regarding "appropriate" single or cross-sex interaction. Finally, some single-sex classes were established to exclude girls from certain occupations or activities. Recently, one of my students recounted her experiences in an ostensibly coeducational technical high school in a large city. She enrolled in this school because she wanted to learn to be a plumber but was not allowed to take these courses. Instead, she and the other girls were placed in classes offering "secretarial science" and office management.

Single-sex classes with these types of aims and programs are no longer prevalent in today's K-12 mixed sex schools. Laws such as Title IX aimed at preventing sex discrimination in education, as well as changing norms about women's and men's roles, have emphasized access to the same educational experiences in school. Usually, it has been argued this can best be accomplished through coeducational classes. However, recently, there has been a slight resurgence of interest in single-sex classes in mixed-sex schools. The impetus for this interest has come from several quite different goals. These include efforts to (1) enhance the academic achievement of girls in specific subjects, (2) support classroom social organization, and (3) provide mechanisms for formal and informal socialization within a specific cultural context—in particular, an African-centered educational context.

Single-Sex Classes and Academic Achievement

The establishment of single-sex classes as a vehicle to enhance academic achievement among girls was in large part a reaction to the realization that access to educational experiences via mixed-sex classes did not necessarily result in equity of educational opportunity. Research such as that published by the Sadkers and the AAUW Educational Foundation[1] has indicated that although girls and boys may occupy the same classroom space, they can sometimes receive quite different educational experiences. Gender stereotyping and gender bias can be major factors in coeducational classrooms. Girls receive less attention and are given fewer opportunities for learning and problem solving than boys. In addition, girls may feel inhibited and constrained in some mixed-sex classes and thus may become less motivated to engage in classroom activities and may demonstrate decreased levels of performance and achievement. These findings were particularly evident in the math, science, and computer related subject areas.

Much of the research on single-sex classes has been discussed in Pamela Haag's literature review (see "Single Sex Education: What Does the Research Tell Us?" in this volume) prepared for this roundtable and thus will not be repeated here. Overall, the studies I have reviewed tended to show mixed results regarding the outcomes of single-sex classes. Four studies are illustrative here:

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Of these, one by Marsh and Rowe[2] was experimental and found little positive effect. The remaining three by Durost[3], Martin[4], and Perry[5] were descriptive. The Martin study is an ethnography aimed more at describing the implementation of a single-sex classroom than assessing its outcomes. Durost reported that a math achievement score differential between boys and girls was narrowed for the girls in single-sex classes over a seven-year period. Perry reported that grade point averages were higher for both girls and boys in single-sex math and science classes than in mixed-sex classes. The mixture of results seen in these studies could be attributed to differences in research aims, designs, and objectives.

Single-Sex Classes and Classroom Organization

A second goal focuses on the establishment of single-sex classes as a means of improving classroom behavior and participation. Studies by Bushweller[6], Evans[7], and Richardson[8] consider this issue. Bushweller, starting from the premise that boys engage in more antisocial behavior than girls, reviewed efforts to intervene on boys' behalf. Among the remedies with positive outcomes reported were all-male classes. Evans looked at the impact of a specific project that utilized single-sex groups, while Richardson described a school in which *all* classes were separated by sex. Both reported improved behavioral outcomes and enthusiasm for both boys and girls. All of these studies were in middle schools. An underlying assumption of this orientation toward single-sex classes appears to be that the developmental characteristics of early adolescents are related to increased difficulties in their ability to cope with classrooms. Similar to the research on achievement, all of these studies were descriptive. Furthermore, most were relatively short-term.

Single-Sex Classes and Cultural Socialization

The third impetus for the establishment of single-sex classes has been as a component of a broader attempt to implement culturally-centered educational models. In this context, single-sex classes have focused on formal and informal socialization of girls and boys. Here, I will focus on African-centered educational models proposed for public schools. One of the underlying tenets of African-centered education is that schools serving African American children need to be closely linked with the communities of their students, and should build upon and reinforce the cultural activities of those communities.[9] This orientation suggests that these schools should not be limited to an academic focus, but should also actively concern themselves with children's social and personal development and with preparing children for the roles they are likely to assume in adulthood. Furthermore, this orientation emphasizes the notion that students are expected to use education not only for individual advancement, but also for promoting and empowering the

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community. One way in which these ideas have been promoted in some contemporary African American communities is through single-sex classes.

African-centered schooling in the United States is not new—it has existed for over 200 years.[10] However, these schools operated primarily in the private sector. Within the past decade, interest has risen in African-centered schooling in public schools. Here, concerns about culturally based education and single-sex education have converged.

The impetus for African-centered schooling

Much of the initial impetus for African-centered schooling in the public sector was fueled by evidence of low achievement, high drop out rates, and high levels of suspensions, expulsion and special education placement of African American boys, particularly in comparison to both African American girls and girls and boys of other ethnic groups. As a result of the glaring evidence of school failure among African American boys, some of the earliest African-centered programs established in public schools focused on them. One example of this involved a project in Baltimore in which African American first- and second-grade boys were taught by African American teachers in single-sex classes for one half day a week.[11] In spite of the well-publicized focus on African American boys, some writers cautioned the educational community not to forget about African American girls. For example, King warned that an overriding emphasis on the problems of African American males could both privilege men and make African American girls and women invisible. She argued for consideration of both gender and class as educators and others developed Afrocentric alternatives to existing practices.[12] Similarly Asante, citing the racial oppression of all African Americans, the sexual oppression of African American women, and the participation of African American men in that sexual oppression, argued that Afrocentric perspectives should be "aggressively non-sexist" in their orientation.[13] These writers as well as others have argued against single-sex educational programs focusing exclusively on African American boys. It should be noted, however, that they did not argue explicitly for single-sex programs for African American girls. Rather, they advocated for the inclusion of African American girls in educational conversations and activities. To my knowledge, the idea of single-sex education has not been a major issue within African American communities, particularly at the K-12 levels. Historically, African Americans have struggled against overwhelming odds to obtain and/or provide education for all children.

The Milwaukee experiment

Concluding that traditional educational institutions had failed African American children in general, educators in several cities espoused educational models that centered African and African

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American history and culture in the curriculum and pedagogy.[14] The Milwaukee (WI) Public Schools district was one of the first to establish African-centered schools. Given the innovative nature of these schools, district administrators indicated there was a need for documentation and evaluation of them. A colleague, Cheryl Ajirotutu, and I agreed to design and implement such a study, the African American Immersion Schools Evaluation Project. The goals of our study were to implement such a study, the African American Immersion Schools Evaluation Project, funded by the Joyce Foundation in Chicago. The goals of our study were to:

1. Systematically and empirically document the implementation of the African-centered program in these two public schools.

2. Provide evaluative feedback to the school staff, district staff, and other local and national researchers and practitioners regarding the implementation and outcomes of these schools.

3. Contribute to knowledge about educating African American children effectively.

Building on our backgrounds in educational psychology and anthropology, we designed a holistic, longitudinal study that included both qualitative and quantitative data at each of the schools for a five-year period. Data collection methods included school and classroom observations; interviews with school staff, students, parents, and supportive community persons; assessments of student skills and self perceptions; and information from school records. To organize the data collected in this project, we identified a schema consisting of the following five study areas: administrative management strategies, staff development, curriculum reform, parent and community involvement, and student outcomes. When school staff decided to implement single-sex classes for socialization as part of the cultural orientation of one of these schools, they were included in our study.[15]

Initially it was recommended to the school board that Milwaukee establish all-male "African American Immersion Schools" at the elementary and middle level. Both the explicit race and gender demarcation proposed for these schools raised a national furor. Indeed, the excitement over the proposals for these schools was so great that many people, even in Milwaukee, did not notice that the single-sex portion of the proposal was quietly withdrawn within a few weeks after the schools were proposed. Subsequently, two coeducational African American Immersion Schools were implemented, one in 1991 and one in 1992.

Almost immediately after these schools were implemented, interest was expressed in single-sex classes for both girls and boys. These classes were conceived primarily as agents for socialization

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The rationale was based on two complex and interlocking premises. One involved the vision of African-centered education as a vehicle through which African and African American history and culture would be recognized as valid and valuable, and African American students begin to see themselves as part of a larger national and international cultural community. This type of identification is seen as empowering young people to take active responsibility for themselves and their futures. The second involved the recognition that many traditional institutions in the United States, including schools, that purported to socialize African American youth failed to consider the particular issues they faced as they attempted to move toward adulthood in an oppressive and racist society. African-centered institutions, it is argued could help students use cultural information as a source to help them cope with and change current conditions.[9] Particular aspects of gender within African American communities related to historic and current sociocultural conditions formed the basis for the emphasis on single-sex classes in these schools.

To elaborate, it has been argued that considerations of gender issues within African American communities need to take into account both historical and contemporary experiences of African Americans. With respect to historical background, gender identities and gender relations have been shaped by both our African cultural heritage and the experiences of slavery in the United States. With respect to contemporary experiences, issues related to gender cannot be separated from issues related to race and class. Thus, in these classes, students discussed African traditions related to gender, the impact of exploitation and oppression of African Americans on men and women, and the actions by African American men and women to resist exploitation and develop alternatives to counteract ongoing oppression.

"Rites of Passage": Single-sex classes in an African-centered school

Since we have studied the two African-centered schools in Milwaukee, we have observed single-sex classes established in one, the middle school, as ongoing after-school programs. These programs are named "Rites of Passage" and they encompass a wide variety of activities. One general aim of both the girls' and the boys' groups is to support academic achievement by emphasizing the connections between the work of school and students' present and future lives. Another goal of these classes is to promote personal and social development emphasizing students' African and African American social context as well as their need to be able to function responsibly and effectively in a broader diverse world. Finally, the adults who have worked with both the girls' and the boys' groups wished to address issues of gender bias and have argued that the single-sex classes can provide an atmosphere in which issues specifically related to gender can be freely and comfortably explored.

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Currently, we are in the midst of analyzing the data we have obtained from our five year study of these two schools. While we are not able to discuss specific findings at this time, it appears that many of the goals of these classes are being met. The single-sex classes have become an integral part of the school's program. Although voluntary, they are open to any student who wishes to participate in them. Both the girls' and the boys' groups have been relatively small, ranging in size from 20-30 students. However, most participants have remained in these classes for more than one year and students' perceptions of the classes have generally been positive. The classes have covered a wide variety of activities, some of which have focused on personal explorations of identity, role, and future development. These have included, for example, group discussions about issues raised by the students as well as presentations to the groups by adults from the African American community. Other activities have linked schools with their communities. For example, both the girls' and the boys' classes have encouraged students to participate, individually or as a group, in events and programs in community institutions outside of school using skills or information learned in the classes. The existence of these classes in this school points to the need to keep cultural and socioeconomic factors in mind when studying single-sex education.

Summary and Conclusions

To summarize, interest in single-sex classes seems to be increasing in K-12 education. However, at this point few definitive conclusions can be drawn about the overall impact of current efforts to implement single-sex classes, especially with respect to their impact on girls. It is difficult to make a general assessment of single-sex classes because of three issues inherent in much of the research and practice in this area. These are (1) the disparity in the goals of single-sex classes, (2) the varieties of ways these classes have been implemented, and (3) a need for more systematic, long-term research in this area.

As evident from the material included in this essay, single-sex classes have been established with a variety of aims or goals. Sometimes these classes are established to focus on achievement issues, sometimes on social and behavioral issues, sometimes on cultural issues, and often on a combination of issues. Furthermore, in some cases, for example in some of the African-centered schools, single-sex classes are established as an extension of the educational and cultural goals of the school, whereas in other situations, the relationship between the single-sex classes and the overall aims and context of the schools is not always clear or at least not explicit.

Single-sex classes have also been implemented in a variety of ways ranging from short term projects to ongoing activities. Sometimes students may attend one or two single-sex classes in a

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day or even a week. In other situations, students appear to spend most of their time in single-sex classes in a nominally coeducational school. Still other single-sex classes take place as after-school activities although they are an extension of, and are deeply intertwined with, the activities of the regular school day. Some schools have established single-sex classes only for girls; in other situations, classes have focused on boys. In a number of cases, both all girls and all boys classes have been established.

Finally, there is a need for more research on single-sex classes. In particular, there is a need for research that takes into account differences in goals and implementation when considering the outcomes of these classes. In addition, few long-term, systematic studies of single-sex classes have been conducted. This is partly because many of the efforts to implement these types of classes are themselves short-term with little follow-up. Furthermore, there are few experimental studies that can tell us if there is a cause-and-effect relationship between single-sex classes and particular outcomes. Many of the studies done are primarily anecdotal. Finally there are few studies that look at single-sex classes within the contexts of the schools in which they are implemented.

In spite of the shortcomings of the existing research on single-sex classes, some threads seem to permeate current studies that suggest some possible positive effects of these classes for girls. Three of these threads are described here:

- First, one finding across studies suggests that single-sex classes are useful for girls because they establish comfortable places to learn and explore the world. This is evident from the self reports in the literature about single-sex classes in math and science. This was also evident in our study of the single-sex Rites of Passage classes.
- Second, single-sex classes provide an opportunity for girls to consider issues of gender identity and the varieties of roles girls and women can consider in today's and tomorrow's society. Evidence from both the literature and our research in the African-centered schools suggests that girls in single-sex classrooms can be encouraged to explore a variety of roles and options.
- Third, single-sex classes may be particularly helpful to girls at the developmental level of early adolescence. This suggestion must be interpreted with caution since it could be an artifact of the large number of studies conducted at the middle-school level. Fewer studies appear to have involved secondary or elementary age students. However, consideration of the developmental changes associated with early adolescence suggests that this is a time when girls become particularly concerned about their sexual identity as they deal with the changes of puberty. Since girls tend to mature earlier than boys, single-sex classes at the sixth- or seventh-grade level may be particularly salient for girls. At the seventh- and eighth-grade levels, such classes may help both boys and girls cope with the developmental changes of early adoles-

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cence. Finally, there may be an indirect positive effect for girls that could emanate from some single-sex classes for boys. In particular, one relatively important component of the Rites of Passage classes for boys in the African-centered school my colleague Cheryl Ajirotutu and I have studied has been an explicit consideration of issues of gender bias and the roles that boys and men play in contributing to the social and psychological oppression of women and girls. At present, we do not know how widespread these types of considerations are in other Rites of Passage classes for African American boys.

Areas for Future Research

Clearly, much more research is needed on this topic. First, additional research needs to look at the outcomes of single-sex classes in terms of the goals established for them. Second, there is a need for research that investigates the impact of various types of single-sex classes. Third, there is a need for research that examines the context within which single-sex classes occur. This includes not only the context of the schools that may offer single-sex classes, but also the context of the communities such schools serve. One particular aspect of context that needs further research has to do with the intersections of class, race, and ethnicity with gender in the establishment, implementation, and outcomes of single-sex classrooms. As evident from the limited research on African-centered schools, such classrooms may have particularistic meanings dependent on the cultural backgrounds of the students served.

As indicated at the outset of this essay, single-sex classes are not a new phenomenon in this society. However, interest in them today reflects very different concerns than those that supported the single-sex classes common in schools until the early 1970s. Considerations of single-sex classes in the 21st century must include their impact on the status and outlook of girls and women, and on the profound changes in class and culture marking our society and others like it.

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Notes

1 See for example, Myra and David Sadker, *Failing at Fairness: How America's Schools Cheat Girls* (New York: Charles Scribner's Sons, 1994) and *The AAUW Report: How Schools Shortchange Girls*, Researched by the Wellesley College Center for Research on Women (Susan Bailey et al.), (Washington, DC.: AAUW Educational Foundation, 1992)

2 H. W. Marsh and K. J. Rowe, "The Effects of Single Sex and Mixed Sex Mathematics Classes Within a Coeducational School: A Reanalysis and Comment," *Australian Journal of Education* 40, no. 2 (1996): 14, 162.

3 R. A. Durost, "Single Sex Math Classes: What and for Whom? One Schools Experiences," *NASSP Bulletin* 80, no. 577 (1996): 27-31.

4 M. V. Martin, *Inside a Gender Sensitive Classroom: An All Girls Physics Class*, (April, 1996) Paper presented at the annual meeting of the National Association of Research in Science Teaching, St. Louis, Mo.

5 W. C. Perry, "Gender Based Education: Why It Works at the Middle School Level," *NASSP Bulletin* 80, no. 577 (February 1996): 32-35.

6 K. Bushweller, "Turning Our Backs on Boys," *American School Board Journal 181*, no. 5 (May 1994): 20-25.

7 M. D. Evans, "A Single Gender Learning Strategy," *Principal* 73, no. 1 (September 1993): 52-53.

8 J. Richardson, "Innovations: Separated by Sex: A Troubled New Jersey Middle School Segregates Girls from Boys," *Teacher Magazine* 6, no 8 (May-June 1995): 14.

9 C. D. Lee, "Profile of an Independent Black Institution: African Centered Education at Work," *Journal of Negro Education 61*, 2 (1992): 160-77.

10 See, for example, M. J. Shujaa, *Too Much Schooling, Too Little Education: A Paradox of Black Life in White Societies* (Trenton, N.J.: Africa World Press, 1994)

11 M. L. Narine, *Single Sex, Single Race Public Schools: A Solution to the Problems Plaguing the Black Community* (Washington, DC.: U. S. Department of Education, Office of Educational Research and Improvement, April 1992).

12 D. H. King, "Unraveling the Fabric, Missing the Beat: Class and Gender in Afro American Social Issues," *The Black Scholar* 22, no. 3 (1991-92) 36-44

13 M. K. Asante, "Afrocentricity, Women and Gender" in *Malcolm X as Cultural Hero and Other Afrocentric Essays* (Trenton, N.J.: Africa World Press, 1993).

14 For a more complete discussion of the premises of African-centered education, see M. K. Asante, "The Afrocentric Idea in Education," *Journal of Negro Education* 60, no. 1 (1991): 170-179.

15 Cheryl Ajirotutu and Diane Pollard, *African American Immersion Schools Newsletter*, vol. 1 (1992): pp. 1, 3-4.

16 N. Warfield-Coppock, "The Rites of Passage Movement: A Resurgence of African Centered Practices for Socializing African American Youth," *Journal of Negro Education 61*, no. 4 (1992) 471-482.

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Appendix

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The materials on pages 87 through 93 were prepared for and distributed at the AAUW Educational Foundation's Single Sex Roundtable on November 12, 1997. They are reprinted here without editing for style or content.

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AAUW Educational Foundation Single-Sex Roundtable Agenda

Wednesday, November 12

8:30 - 9:00 Coffee

9:00 - 9:15 Welcome and Introductions:

Maggie Ford, President, AAUW Educational Foundation
Janice Weinman, Executive Director, AAUW, AAUW Educational Foundation, AAUW Legal Advocacy Fund
Karen Sloan Lebovich, Director, AAUW Educational Foundation
Pamela Haag, Research Associate, AAUW Educational Foundation

9:15 - 10:30 Single-Sex Schools: Two Presentations and Question Period

Moderator: Carol Nagy Jacklin
Valerie Lee, University of Michigan - (10 minutes)
Neil Riordan, Providence College - (10 minutes)

10:30 - 10:40 Break

10:40 -11:45 General Discussion with Participants and Presenters

11:45 - 1:00 Lunch

1:00 - 1:20 Single-Sex Classes: Two Presentations and Question Period

Moderator: Carol Nagy Jacklin
Patricia Campbell, Campbell-Kibler Associates with
Ellen Wahl, Education Development Center- (10 minutes)
Diane Pollard, University of Wisconsin-Milwaukee - (10 minutes)

1:20 -2:45 General Discussion with Participants and Presenters

2:45 - 3:00 Break

3:00 - 4:30 Discussion of research gaps, new directions and methodologies

Moderator: Carol Nagy Jacklin

4:30 - 5:00 Wrap Up and Conclusion:

Priscilla Little and **Pamela Haag**

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AAUW Educational Foundation Roundtable Single-Sex Schools and Classes: What Does the Research Tell Us?

Presenters and Moderator

Patricia B. Campbell is the Director of Campbell-Kibler Associates, an educational consulting firm specializing in materials development in science and math education, educational research and evaluation, computers in education, and sex and race equity. Campbell has served on numerous committees of the American Educational Research Association and as a consultant to several educational research journals. Her writings include articles, books, and book chapters, such as "Educational Equity and Research Paradigms," "Race and Sex Bias in Research Methods," and "Redefining the 'Girl' Problem in Mathematics." Campbell received her Ph.D. from Syracuse University in Teacher Education.

Valerie E. Lee is Professor in the School of Education at the University of Michigan. Among Lee's writings on single-sex education are "Sexism in Single-Sex and Coeducational Secondary School Classrooms," "Sustained Effects of the Single-Sex Secondary School Experience on Attitudes, Behaviors, and Values in College," and "Effects of Single-Sex Schooling on Student Attitudes and Achievement." Lee coauthored *Catholic Schools and the Common Good*, which received the Willard Waller Award from the American Sociological Association. She has received fellowships from National Academy of Education and the Department of Education's Office of Educational Research and Improvement (OERI). Most recently, Lee was a Scholar-in-Residence at the Rockefeller Study Center in Bellagio, Italy. She received her Ed.D. in Administration, Planning, and Social Policy from Harvard University.

Carol Nagy Jacklin is Professor Emeritus with the Department of Psychology at the University of Southern California. In addition to previous faculty posts, Jacklin has served as Dean of the Faculty of Arts & Sciences at the College of William & Mary and as the Director of Research at the University of Southern California's Institute for the Study of Women and Men in Society. Among Jacklin's writings on gender and education are *The Psychology of Sex Differences*, "Sex Differentiation and Schooling," "Sex Differences and their Relationship to Sex Equity in Learning and Teaching," and "Gender Segregation in Childhood." She earned her Ph.D. from Brown University in Experimental Child Psychology.

Diane S. Pollard is Professor of Educational Psychology and the Director of Doctoral Studies in the Urban Education Doctoral Program at the University of Wisconsin-Milwaukee's School of Education. She previously served as Director of Diversity Initiatives for the University of Wisconsin-Milwaukee and Director of University of Wisconsin Systemwide Center for the Study of Minorities and the Disadvantaged. Pollard received the Willystine Goodsell Award from the American Educational Research Association, Committee on the Role and Status of Women in 1996 for outstanding contributions in research and service. She is currently Co-Principal Investigator in a five-year project entitled, "Planning for School Reform in Milwaukee: Education for the Year 2000. The African American Immersion School Experience." Pollard earned a Ph.D. in Educational Psychology from the University of Chicago.

Cornelius Riordan is Professor of Sociology at Providence College. Riordan's work on single-sex schools includes, *Girls and Boys in School: Together or Separate* and "Single-Gender Schools: Outcomes for African and Hispanic Americans." He is the co-author, with David Baker and Maryellen Schaub, of "Sex Groupings and Improving Mathematics Achievement: Lessons from a Comparative Analysis." Riordan earned a Ph.D. in Sociology from Syracuse University and has received fellowships from The Johns Hopkins University, the Sloan Foundation, Stanford University, and the National Endowment for the Humanities.

Ellen Wahl is Senior Scientist with the Center for Children and Technology at Education Development Center, Inc. She is currently Co-Principal Investigator of two NSF-funded research and development projects, one of which is the Collaboration for Equity, a partnership with the American Association for the Advancement of Science to make equity a central consideration in the efforts to reform math and science education. Wahl previously served as national Program Director at Girls, Incorporated. She received her M.A. degree in Health Education from Teachers College-Columbia University.

Participants

Annette Henry is Assistant Professor in the College of Education at the University of Illinois-Chicago. She received a Spencer Post-Doctoral Fellowship from the National Academy of Education for "Invisible to the Naked Eye: Gender, Race, Class, and Schooling: An Inquiry into the Practice of Black Women Teachers Regarding Young Adolescent Black Girls." In addition to published writings, Henry's presented papers include, "Understanding the Needs of Black Girls as Learners: Examining Three Students' Writing in a Weekly Reading/Writing Program," and "Obedient and 'Womanish': Black Girls Negotiating Their Lives in School." She received her Ph.D. in Education from The Ontario Institute for Studies in Education.

Sue Klein is Senior Research Associate with the Department of Education's Office in Educational Research and Improvement (OERI). The editor of the *Handbook for Achieving Sex Equity Through Education* and *Sex Equity and Sexuality in Education*, Klein also contributed chapters to these works. In addition to extensive articles and presented papers, Klein served as editor of Theory Into Practice and The Peabody Journal of Education for each journals' special issue on sex equity and education. Klein earned her Ed.D. from Temple University.

Jasna Jovanovic is Assistant Professor in the Department of Human & Community Development and the Women's Studies Program of the University of Illinois-Urbana. Her writings include, "Boys and Girls in the Performance-based Science Classroom: Who's Doing the Performing?," "Performance-based Assessments: Will Gender Differences in Science Achievement be Eliminated?," and "Gender and Racial/Ethnic Differences on Performance Assessments in Science." An AAUW Educational Foundation American Fellow, Jovanovic received her Ph.D. in Human Development & Family Studies from Pennsylvania State University.

Paul C. LePore is Assistant Professor in the department of sociology at the University of Washington. He recently coauthored an article, "A Comparison of Single-sex and Coeducational Catholic Secondary Schooling: Evidence from the National Educational Longitudinal Study of 1988." LePore is now working on a coauthored study measuring the reciprocal relationships between academic achievement and adolescent employment, and is developing a discrete choice model of high school selection to incorporate the individual, family, and school level measures that affect entry into particular high school sectors. LePore recently earned a Ph.D. in Sociology from the University of Wisconsin.

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Helen Marks is Assistant Professor in the School of Educational Policy and Leadership at Ohio State University. Her most recent work on single-sex education is "Single-Sex and Coeducation" in *Education and Sociology: An Encyclopedia* (forthcoming). She has coauthored several studies on single-sex education and gender-related educational issues in collaboration with Valerie Lee such as, "Who Goes Where? Choice of Single-Sex and Coeducational Independent Secondary Schools," "Sexism in Single-Sex and Coeducational Secondary School Classrooms," "Sustained Effects of Single-Sex Secondary School Experience on Attitudes, Behaviors, and Values in College," and "Gender Differences in Teachers' Influence Over School Policy and Classroom Control." Marks earned her Ed.D. degree from the University of Michigan.

Leonie Rennie is Associate Professor at the Science and Mathematics Education Centre of Curtin University of Technology, as well as Acting Director of the Key Centre for School Science and Mathematics. Rennie's work, which has been published in both Australian and international journals, includes *Gender, Science, and Mathematics: Shortening the Shadow*, "Structural Change in Curriculum: The Implications for Equitable Participation and Achievement in Mathematics," and "Students' and Teachers' Perceptions of Single-sex and Mixed-sex Mathematics Classes." Rennie earned a Pd.D. in Education from the University of Western Australia.

Carol B. Shmurak is Associate Professor at Central Connecticut State University's Department of Teacher Education. Her work on single-sex education includes, *Voices of Hope: Adolescent Girls at Single-Sex and Coeducational Schools* (forthcoming), "Girls' High Schools: How Empowering Have They Been?," "Gender Equity and Gender Bias in the Middle School Classroom," and "Attitudes and Aspirations of Female Adolescents: A Longitudinal Study-in-Progress" (AERA presentation). She received her Ph.D. in Science Education from Indiana University.

Margaret Signorella is Professor of Womens Studies at the McKeesport Campus of Pennsylvania State University. Her published works include, "Single-sex Versus Mixed-sex Classes and Gender Schemata in Children and Adolescents: A Longitudinal Comparison," "Relations of Masculinity and Femininity in Self-concept to Spatial Performance in Adolescents," and "Masculinity, Femininity, Androgyny, and Cognitive Performance: A Meta-analysis." Signorella earned her Ph.D. in Psychology from Pennsylvania State University.

Janice Streitmatter is Associate Dean of the College of Education at the University of Arizona, where she is also Associate Professor of Educational Psychology. She was previously a special education teacher for learning disabled students and emotionally handicapped students. *For Girls Only: Making a Case for Singe-Sex Schooling* (forthcoming), "Girls-only Classes in Public School: Ambivalence and Support," and "An Exploratory Study of Risk-taking in a Girls-Only Middle School Math Class" are among her works on single-sex education. Streitmatter received her Ph.D. in Educational Administration from the University of Arizona.

John Robert Warren is a doctoral student in Sociology at the University of Wisconsin-Madison. His dissertation, "A Life-Course Perspective on the Process of Occupational Attainment," describes changes across the life course in the effects of gender, family background, education, and cognitive ability on occupational attainment using data from two recent surveys. Warren coauthored "A Comparison of Single-sex and Coeducational Catholic Secondary Schooling: Evidence From the National Educational Longitudinal Study of 1988" with Paul LePore; the two recently presented "The Advantages of Single-Sex Catholic Secondary Schools: Selection Effects or School Effects?" at an AERA annual meeting.

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Board Members & Staff

Maggie Ford is President of the AAUW Educational Foundation. In addition to her role at the Foundation, she is Director of Development at the Village for Families & Children, Inc., a 200-year old organization which provides remediation and intervention services to abused children and families. Prior to this post, Ford spent 25 years in higher education advancement for 2- and 4-year public and private institutions and three state post-secondary systems. As a consultant, Ford specializes in fundraising for small non-profit organizations. Ford received an MAT from the University of New Hampshire and has pursued further graduate study at Boston University.

Carolyn Garfein is AAUW's Program Vice President, as well as Leadership Training Chair for the state of Georgia. A member of AAUW since 1973, she previously served as Membership Vice President and has held several leadership positions at the state level. Garfein has extensive experience in marketing and research firms and is currently Senior Vice President of The Marketing Workshop, Inc., a marketing research and consulting firm. Garfein received an MBA from California State University-Long Beach.

Pamela Haag is the Research Associate with the AAUW Educational Foundation. Prior to joining AAUW EF last year, she was a postdoctoral fellow at the Pembroke Center for Research on Women, Brown University, and, before that, a fellow at the Rutgers Center for Historical Analysis. She also has received fellowships from the National Endowment for the Humanities and the Mellon Foundation. A book based on dissertation research, *No Means No: Historical Essays on Sexual Consent and Violence in American Culture*, is forthcoming from Cornell University Press. Haag recently received a Ph.D. in History from Yale University, where she specialized in American cultural history and gender studies.

Marion Kilson is Program Vice President for the AAUW Educational Foundation. Outside of her AAUW involvement, she is Dean of the Graduate School at Salem State College in Salem, Massachusetts. Kilson has held administrative and faculty positions at several colleges and universities in Massachusetts over the past three decades. Her research and publications center on African and African American societies, as well as women in American higher education. She received a Ph.D. in social anthropology from Harvard University.

Priscilla Little is the Director of Research Initiatives at the AAUW Educational Foundation. She directs the commissioned Eleanor Roosevelt Fund research projects for the Educational Foundation. Formerly, she was the Director of Programs for the Virginia Foundation for the Humanities, Division of State Programs, National Endowment for the Humanities in Charlottesville, Virginia. She is currently a member of the steering committee of Woman Administrators in Higher Education and has served as chair for the George Washington University Ecumenical Council. She holds an M.A. from the University of Virginia.

Karen Sloan Lebovich is Director of the AAUW Educational Foundation. In this capacity, Lebovich is responsible for directing the AAUW Educational Foundation's fellowship, grant, research, program, development, and fundraising efforts, and overseeing the Foundation's $100 million in assets. The AAUW Educational Foundation issues more than $2.7 million in fellowships and grants each year. Lebovich has held a variety of leadership positions in the nonprofit sector, higher education, and government, including posts at American University, the League of Women Voters, and the National Science Foundation. She received her B.A. from Simmons College.

Janice Weinman is Executive Director of the American Association of University Women (AAUW), AAUW Educational Foundation, and AAUW Legal Advocacy Fund. Prior to joining AAUW, she was executive vice president of the College Board, where she created the nationally recognized Pacesetter program to help all students prepare for the transition from high school to college. Weinman also served as the vice president of academic affairs at the Fashion Institute of Technology, special assistant to the U.S. Commissioner of Education, and director of the Office of Executive Planning and the Bureau of Research and Assessment of the Massachusetts Department of Education. Weinman holds an Ed.D. from Harvard University.

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K-12 Single Sex Education Roundtable: Presenters, Participants, Observers

Presenters

Pat Campbell, Campbell-Kibler Associates, MA
Valerie E. Lee, University of Michigan-Ann Arbor, MI
Cornelius Riordan, Providence College, RI
Ellen Wahl, Educational Development Center, NY
Diane Pollard, University of Wisconsin-Milwaukee, WI

Moderator

Carol Nagy Jacklin, University of Southern California (Professor Emeritus), CA

Participants

Paul Le Pore, University of Washington, WA
Sue Klein, OERI, Department of Education, DC
Carole B. Shmurak, Central Connecticut State University, CT
Jasna Jovanovic, University of Illinois-Urbana, IL
Leonie Rennie, Curtin University of Technology, Australia
Margaret Signorella, Penn State-McKeesport Campus, PA
Jan Streitmatter, University of Arizona, AZ
Annette Henry, University of Illinois-Chicago, IL
Helen Marks, Ohio State University, OH
Robert Warren, University of Wisconsin, WI

Observers

Rita Kirshstein, American Institutes of Research, DC
Cheryl Sattler, American Institutes of Research, DC
Irene Harwarth, OERI, Department of Education, DC
Ellen Hoffman, Consultant, WV

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Susan Morse, Managing Editor
Gillian Ray, Senior Media Associate
April Osajima, Senior Program Associate, Initiative for Educational Equity

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About AAUW

The American Association of University Women is a national network of 160,000 members, 1,600 branches, and 750 colleges and universities dedicated to tearing down barriers to equality and creating opportunities to help women and girls reach their full potential.

AAUW was founded in 1881 on the conviction that education is key to achieving equity for women. Our first study in 1885 helped open colleges and universities to women by refuting the once-popular notion that higher education threatens women's health. Today, more than a century later, we're still fighting to remove obstacles that hold women back.

While education is our primary focus, AAUW has always spoken out on vital social, economic, and political issues. We condemn all forms of discrimination. We champion gender-fair education, civil rights, family and medical leave, equal pay for equal work, reproductive choice, affirmative action, and access to health care.

If equity is at issue, we're there. Lobbying legislators. Raising money to fund research. Publishing groundbreaking studies. Spearheading community action projects. Launching voter education campaigns. Mentoring women and girls. Working with educators to better engage girls in learning. Awarding fellowships and grants to outstanding women around the globe through the AAUW Educational Foundation. Providing legal support to fight sex discrimination through the AAUW Legal Advocacy Fund.

Join us and make a difference in the lives of women and girls for generations to come.

Membership in AAUW is open to anyone with a bachelor's or higher degree from an accredited college or university. You can join one of more than 1,600 AAUW branches in every state across the country—even workplace branches and on-line branches in cyberspace!—that offer opportunities for grassroots activism. Branch members meet on a regular basis to develop programs that promote equity. Branch members are also part of their state AAUW and the national organization.

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